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Thomas A Edison Papers

A SELECTIVE MICROFILM EDITION

PART III
(1887–1898)

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A Note on the Sources

The pages which have been filmed are the best copies available. Every technical effort possible has been made to ensure legibility.

PUBLICATION AND MICROFILM COPYING RESTRICTIONS

Notebook, N-90-01-04.2

This notebook was begun during January 1890. Most of the entries are by Edison. There are also some entries by an unidentified assistant. The book contains lists of mines, mainly in North Carolina, but also in Georgia, the New England states, and the Great Lakes region. Among the ores noted are gold, copper, and iron. Also included are notes by Edison to surveyors Samuel G. Burn, Arthur C. Payne, and Charles J. Reed regarding mining regions in the northeastern United States. The front cover is labeled "#585." The inside front cover is inscribed "#585 T A Edison Jan 4. 90." The pages are unnumbered, and the book has been used in both directions. Approximately 70 pages have been used.

#585

XE-172

N-90-01-04.2

~~TA~~ Edison
~~Jan~~ 4.90

Rudisel Mine — Gold & Cop —
Soled pyrites of Cu with Au at water line
3 @ 4 ft 1/2 mile — Double vein which
if united at 600 ft make immense vein

Northampton Mining Dist
Mass — Vein 3 miles long
Cu pyrites Blende Lead with silver
6 @ 12 ft thick — Enough ore for
ages ~~[illegible]~~ Its in Massachusetts

Mining Mag Vol 2 634 p.
Loudville Mine big mine same Dist —

North Carolina Cop mine — Except
in 1834 says best in US —
Mining Mag Vol 2 : 77

Chatham Nickel + Cobalt
Mine Chatham Conn
Unlimited quantity ore
Cheaply mined 2 @ 3 pct.
run of mine - been wked -
Mining Mag Vol 2 p 113

Middletown Conn Lead Mine
+ at depth Copper mine
3/4 mile long 5 ft 4
Miles from Chatham
mine - Contains nickel
as nickl + 75 oz Silver ton
ton lead.

Vandenburgh Mine NC
Immense deposit gold
Mining Mag Vol 2 310-11-
pyrites

Loachim Gold mine
Georgia Ethem End Union
Co — 3 miles long 2 Veins
side walls rich -gold
Mining Mag Vol 2 309

Plymouth Copper mine
Township of Plymouth
Connecticut - Vein 3/4
mile long
Mining Mag Vol 2
318

Hale Mine Lancaster Dist S C
abt 25 miles North Camden
on route to Monroe N C
& 18 miles from Lancaster
Village Immense
deposit . Massive quartz deposit
of Rocky Mount
Mining Mag Vol 2 US -
384
of what?

Steele Mine – Montgomery Co N.C near Uwharrie ~~Ha~~ River

Henderson Mine Montgomery Co NC near Uwharpie River

Davis Mine. Union Co. 6 miles south of Matthews on Carolina Central Railway

Davis, Phiffer & Lewis mines are close together.

Bedded Veins — not yet shown be in commercial value

Exists quantity - gold on 400 fine — Vien matter

Galena with Silver-Gold —

Hemby Mine - just north of Lewis Mine — galena in gold deposits which are numerous.

Smart Mine — Union Co NC — 4 miles nearly
Southeast of Matthews + about 1 mile south of
CCRR — galena in relatively large quantities,
resources mine unknown by reason want home mkt
for galena - Mine was worked as gold mine + galena
was objectionable - abandoned - Ore body proved
depth 110ft 3 levels. 35 60 95 ft — Each 60 ft
length J C Bates Esq of Monroe has information about
underground work — Vein 3 @ 4 feet thick - ore
seam considerably less — ore galena — pyrite in
Quartz Matrix - Assay No 1 6/10 oz gold
3 1/20 Silver No 2 - 2 1/4 oz gold 4.6/10 oz Silver —
parties claim average value ore $30 per ton 1/2 Ag 1/2 Au —

Lemmonds Mine – Union County 2 miles NE of Smart. sometimes called Marion Mine · gold silver galena –

Stewart Mine – Union Co NC.

Moore Mine. Union Co 1½ miles NE of Stewart,

Long or Crowell mine same neighborhood as Moore mine.

Rocky River Mine near Rocky River in Cabarrus Co 10 miles nearly SE from Concord

Allen Furr Mine. or (Silver Valley) 11 miles. Southeast. Concord + same neighborhood as Rocky River Mine.

McMakin Mine. in SW of Gold Hill Dist in Cabarrus Co –

Trautman Mine Cabarrus Co NC. 1 mile SE of Gold Hill

Silver Hill Mine. Davidson Co NC
10 miles SE from Lexington + Silver Valley
5 miles NE from Silver Hill. + near Borders of Randolph Co

Silver Valley Mine 5 m NE Silver Hill

Welborn Mine.. Davidson Co NC 2 m W of Silver Hill

Steel Mine.- Montgomery Co- 10 @ 12 m E of above belt. Its on east side of Uwharrie River 2 m SE of Eldorado Village

Henderson Mine · near Eldorado Village
Montgomery Co NC

Baryte Mine. along east flank of King
Mountain Range from Crowders Mountain
to Yorkville SC.

Flint Knob Mine – at Flint Knob. Wilkes
Co NC Westpart of County 6 m E of
Deep Gap of the Blue Ridge & not far from
both Watanga & ~~A~~Ashe Co.s

Queen Cedar Cove & Dobson Mine's
near the east foot of Mountains
in McDowell Co –

Baker Mine · Caldwell Co NC 12 miles nearly N of Morgantown E side Johns River -

Peach Bottom Mine (or Maxwell) in Alleghany Co NC

Copper Mine CM N Carolina —

Hodges Mine · Guilford Co · near Fisher Hill.

North Carolina Mine or Fentress Mine.

Gardner Hill Mine. Guilford Co NC
3 m nearly E of Jamestown

Twin Mine. Guilford Co 6 m SE of
Greensboro.

cm

North State Mine. or McCulloch Mine.
Guilford Co 2 m S slightly E from
Jamestown —

Jack's Hill mine. $\frac{1}{3}$ mile beyond
North State.

Phoenix Mine. S E part Cabarrus Co NC

Pioneer Mills Mine SE part Cabarrus Co

CM

Morrison Mine 1 mile from Pioneer Mine.

Crosby or (Poplar) Mine same Vicinity

Rogers Mine same vicinity

The Ray mine.

Ferris Mine

McGinn. Mine
5 m W Charlotte

Mecklenburg Co

Kerns, or (Hopewell)
11 miles NE Charlotte –

G C Cathey Mine,

Mc Leary Mine,

Cathey Mine,
5 m SE Charlotte.

Mecklenburg Co

Dunn Mine 90 miles N of W. from Charlotte.

Conrad Hill Mine. Davidson Co 7 miles a little S of E from Lexington.

Gold Hill Mine. Gold Hill Rowan Co.

Spencer Copper Mine. Randolph Co

Sloan Mine. at Forks of Deep & Rocky Rivers 1 mile from each Randolph Co

Clegg Mine - Chatham Co

Emmons or (Davidson Mine) Davidson Co
9 miles E of Lexington,

Cid Mine. $1\frac{1}{4}$ mile N E of Emmons ~~Mine~~

Foust Mine Alamance Co. South foot of
Bass Mountain

Chick Mine, Chatham Co - 1 mile
N of Deep River

Phillips Tract Mines; test holes - 2 1/2 m NE
of Chick. Chatham Co —

Big American Mine or (Roysters)
Granville Co — 1/2 mile E of Blue Wing

Luck mine near Big American

Silver Nugget Mine. near Big American

Holloway Mine. $2\frac{1}{2}$ m a little W of S from Big American Mine –

Mastodon Mine (or Pocahontas) is near Granville – Person County Line.

Poole Mine. Person Co $\frac{1}{4}$ mile nearly W of Mastodon Mine.

Buckeye Mine. near Poole mine.

Gillis Mine. 1 mile S of Buckeye

Copper World Mine. Person Co. 1 ½
m a little W of S from Gillis Mine, or Gillis -

Yancey Mine Person Co 1 ½ miles nearly
South of above.

Burrell Wells Copper Vein - Gaston Co
2 m S of Tuckasege Ford on Catawba
River

Graham Copper Vein - Lincoln Co - NC
on farm Maj W A Graham - 4 miles NE
from Iron.

Waryhut Mine - Jackson Co on
Waryhut Creek. 6 M SE of Webster.

Cullowhee Mine. on Cullowhee
Mountain SE of former

Savannah Mine 9 miles SW of
Webster on Savannah Creek - Jackson Co

A Copper Mine - Northern part Haywood
Co near Wilkins Creek

Copper Outcrop - near head Big Ivey Creek.
not far from Madison + Buncombe Co line
See C D Smith Reverend - wrote Essay on
Geology NC - seems to know lot - might engage
him -

Elk Knob Copper Mine —
NE Slope of of Elk Knob Mountain

Miller Mine Southern base Mountain

Copper Knob Mine or (Gap Mine) SE part Ashe Co. 3 m W of Summit of Blue Ridge $1\frac{1}{2}$ miles E of New River —

Ore Knob Copper Mine — most remarkable vein in state — situated at Ore Knob in S.E Corner of Ashe Co near Top Blue Ridge Mts & 2 miles fm New River —

Gold Mines

~~Mines in NC now working~~

Portis Mine. NE Cor Franklin Co near to Nash & Warren — on hill 108 ft above Shocco Creek —

Arrington Mine Nash Co. 1 mile SE of Portis

Thomas Mine — Kearney — Taylor — Mann — & Davis Mines in Halifax Co

Nick Arrington Mine 12 miles E of Portis —

Bell Mine Moore Co - 10 m NW of
Carthage. + 1/4 mile W of Red Sandstone

Grampusville Mine Moore Co
3 m SW of Bell Mine —

Brown Mine Moore Co on N W Edge
of the Gold District - on the Road from Moffitts
to Richardson's Mill -

Bat Roost Mine
} Same vicinity
Shields Mine

Cagle Mine Moore Co. 2 or 3 M
S E of Brown & Bat Roost.

Clegg Mine. Moore Co. $\frac{1}{4}$ m W of
Cagle on opposite side of Cabin Creek

Burns Mine - Moore Co. $\frac{1}{2}$ mile. S of
Cagle.

Moore Mine. North East of ~~Reynolds~~ Troy
Montgomery Co NC

The Reynolds Mine. 6 m NE of Troy

The Carter Mine a little nearer Troy

Sam Christian Mine. SW of Troy
Allen Montgomery Co,

Russell Mine. Montgomery Co-

Morris Mountain Mine. or (Davis)
or Dutton - NW part Montgomery Co.
1 m nearly W of Coggins

Appalachian Mine. or (Coggins)
NW part Montgomery Co 1½ NW of
Steel

Steel Mine & Saunders E side of the Uwharrie River & 2 m SE of Eldorado Village

Beaver Dam Mine. Flagtown P.O. 2 m NE of junction Beaver Dam Creek & the Yadkin River

Griffin Mine. 1 $\frac{1}{2}$ m NE of Russell & Nall. near Stokes Ferry

The Uwharrie Mine short distance north east of the Russell Mine just over the line in Randolph County

Hunningham and Slack mines
Randolph County two and a half
miles south of Ashboro

Davis Mountain Mine, Randolph
County four miles southwest of
Ashboro

Sawyer Mine, Randolph County
five miles northwest of Ashboro.

Winslow Mine, Randolph County
five miles South west of Ashboro.

The Jones or Keystone Mine, Randolph County, twelve miles a little East of South from Thomasville and near Davidson County line.

The Parish Mine, Randolph County, Same place as above.

The Hoover Hill Mines, Randolph County, seventeen miles a little East of South from ~~High~~ High point.

The Wilson Kindley Mines Randolph County, half a mile southwest from Hoover Hill

Hearne Mine, Stanly County, two miles north west of Albemarle

Hairtcock Mines - Same place as above.

Parker Mine, Stanly County, at Bilesville, ten miles southeast of Gold hill.

Flint Spring mine, same place as above

Crowell Mines - Same place as above.

Barringer Mines, Stanly County, four miles Southeast of Gold Hill -

Hovie Mine, Union County 1 1/4 miles N. W. of Washington -

Washington Mine, Union Co. eight miles distant a little S. of W. from Monroe.

Davis Mine, Phiffer Mine,
Lewis Mine, Hemby Mine,
Union County, near Washington
Mine -

Moorehill Mine situated
1 m. S. E. of the Davis mine -

Folger Hill Mine half mile
W of the Davis

Harkness Mine ½ m., E. of the Lewis Mine--

Croump Mine, Union County four m. S. from Stouts Station on Carilina Central Railroad

Stewart Mine towards the northern part of Union County 15 m. nearly S. E. of Charlotte –

Reed Mine, Cabarrus County 10 m. S. E. of Concord.

Rocky River Mine, Union County, ten m. nearly South E. of Concord not far distant from the Reed Mine, it includes the Jake Shin and Tom Shin mine

Gold Hill Mines 14 m.
South E. from Salisbury in
the South E. part of Rowan
County and the north East
part of Cabarrus County.

Randolph Mine, Gold Hill district,

The Barnhardt, Gold hill district

Old Field Mine - Gold Hill district

Trautman Mine, Gold Hill district

McMackin Mine, Gold Hill district

Hunnicut Mine, Gold Hill district

Conrad Hill Mines, Davidson County about 7 M. nearly E. from Lexington -

Ward Mine, Davidson County. 1 M., W. of Delk -

The Hamilton or Bailey Mine Anson County 2 M., S. E. of Wadesboro -

Jessie Cox Mine, Anson County
2 M., S. E. of Wadesboro-

Lalor Mine, Davidson County,
two M., S. E. of Thomasville -

The Loftin Mine, Davidson
County - 1½ M., S. E. of Thomas
ville -

Eureka Mine - ½ M. W. of the Lalor Mine -

Yadkin Mine Rowan County - 1½ M S of Salisbury -

The Dunns Mountain Mine 4 M. S. E. Salisbury -

P

Reimer Mine, Rowan County,
5 M. S. E. Salisbury -

Bullion Mine - 1/2 M., E.
of the Reimer Mines -

Gold Knob Mine, 9 M., S. E.
Salisbury -

Haynes Mine - Same Place

Holtshauser Mine - Same place

Dutch Creek Mines - Stokes Ferry Road - 10 M S. E. of Salisbury and just to the S. E. of Dutch Second Creek

Atlas and Barrie Mines - near the above.

Quaker City Mine - Cabarrus County 5 M. a little S. of E. from Concord.

Tucker Mines 8 M., S. E. of Concord.

Phoenix Mine - Same place -

Davidson Hill Mine - Mecklenburg County 1 M. west of Charlotte.

The Point Mine, ~~Rudisil &~~
Same Place.

Rudisil Mine. 1 M. from Charlotte.

St. Catherine Mine 1/2 M. S. of Charlotte.

Blake Mine, Parkes Mine, Clark Mine, Smith & Palmer Mine, McDonald Mine, Wilson Mine, Howell Mine, Trotter Mine, Carson Mine, Taylor Mine, ~~Icen~~ Icenhour Mine, all in the vicinity of Charlotte.

Hayes Mine - McGee Mine, Brawley Mine, Frazer Mine, Hipp Mine, Campbell mine, Todd Mine, Arlington Mine Capps Mine, McGinn Mine, ~~Stephen~~ Wilson Mine. ~~Traut~~ Trautman Mine, Prim Mine, Abernathy Mine, Alexander Mine Dunn Mine, Sloane Mine, McCorkle Mine, Cathey Mine, all within 5 to 10 M. W. and N.W. of Charlotte.

Ferris Mine, 6 M., N. of Charlotte.

Hunter Mine, Fredrick Mine
Ray Mine, at Providence
~~township~~ about Sardis Church
Some 5 to 10 M., S. E. and E.
of Charlotte.

Johnson Mine, Stinson Mine
Maxwell Mine, Black Mine,
Harris Mine at Pioneers Mills
Cabarrus County extending
into N.E. part of Mecklenburg
County.

Baltimore and North Carolina
Mining Co's. mine - Mecklenburg
County, 9 M., S. E., of Charlotte
and 1 M from Mathews -

The Oliver Mine, Gaston County, 12 M. N. W. of Charlotte on W side of ~~Cata-~~ Catawba River.

Farrar Mine 1/2 M beyond Oliver Mine.

Rhyne Mine, 17 M. W. of Charlotte.

Derr Mine – Same as Rhym

Rhodes Mine, Gaston County,
18 M, S. W. of Charlotte

Duffie Mine – Gaston County
16 M ~~from~~ W from Charlotte
on the Tuckasegee Road.

Robinson Mine, adjoins the Duffie -

Smith Mine - 13 M., W. of Charlotte.

~~Sam Bettie~~

Sam Beattie Mine, just South of the Smith Mine.

Long Creek Mine, near the
the Smith Mine.

Burrell-Mills Mine 3½ M
S. of the Duffey

Mc Leans Mine, Gaston County -
15 M., S. W. from Charlotte.

Catawba or Kings Mountain Mine, Gaston County, 1/2 M nearly South of Kings Mountain station on the Atlanta and Charlotte Airline railroad.

Crowders Mountain Mine, 4 M East of Catawba Mine on the E. side of Kings Mountain.

Patterson ~~mine~~ Mine, Gaston Co.
1/4 N.E. of Crowders Mine.

Hoke Mine, Lincoln Co. 4
miles from Lincolnton.

Shuford Mine, Catawba Co.,
4 1/2 M., slightly S. of E. from
Catawba Station on the W. N.
C. Railroad and 6 M. W. of
Sherrills Ford.

Butler Mine, ~~D~~Davie County -
8 M., S. W. of Mocksville.

The Isaac Allen Mine 1 m.
N. W of Mocksville -

Clarksville Township Mines
7 1/2 m. N. W. of Mocksville.

Fulton Township Mine
7 M., N. E. of Mocksville.

Barnes Mines, Alexander Co.,
8 M., W. of Taylorsville --

Miller Mine, Caldwell Co. 2 M
E. of John's river -- Same place
Michaux Mine. Pass Hill
Mine, Corpening Mine.

Mines worked in NC

[THIS BOOK WAS USED IN BOTH DIRECTIONS. THE FOLLOWING PAGES WERE FILMED FROM THE BACK END FORWARD.]

THOS. A. EDISON,
ORANGE, N. J.

Iron Ore Hunters Island — Extension Vermillion Range into Canada —

Largest of the Slate Islands — Lake Superior —

Gros Cap — near Michipicoten.

North of Batchawana bay on Pel[illegible] Bell Location & Larger granites at head of Pancake River

Township of Dalhousie, Lanark Co and adjacent regions —

Rat Portage E side of Winnipeg River bet Lake Woods & English River

Blairton Iron Mines Lot 8 1st Concession of Belmont in Co of Peterboro — sup 130

Glendower Mine Range
20 miles long. Township of
Bedford Co of Frontenac
4 M E of Kingston & Pembroke
RR. connected by a switch.

Calabogie Mine. Mine No 4.
Lot 16 in 8th Concn of
Bagot 1½ m direct line
E of Kingston & Pembroke RR.

Haleburton Mines -

Howland Mine. Lot 26,
Concn 4 of Snowdon -
p. 131

Pine Lake Mine - p 132

Old Geology 1863 –

p 33 34 p 35 – p 37

p 245 Important p 247 246 –

248 249 251

Chrome 266 – do 270 464

472 – 489

Important 501 502

505 506 – Nickel – Elizabethtown –

515 609 613 615

616 673 674

675 676 677 678

737 738 – nickel 749 – chrom

750 – Cobalt 754 –

Burns p 798 – 799

802 803

See N-90-07-12
Page. 127. →
[illegible]

Notes for Paine –

Haverstraw Mining Co – p 220
Mining Mag Vol 2 750 acres
West bank of Hudson 5 m fm Ryea
formally named Horseshoe lover
mine – inexhaustable, mined for
25c – magnetic

= Burns = p 552 553
Mining Magazine Vol 1

Paine = p 715 of US geolgl
Rep 1887

Burns = p 739 USGl Rep 1887
p 741 chromite – do p 742
Paine = p 745 = 759 –

Reid - p 762 - geol US 1887
p 762

Paine 768 - US geRep 1887

Burns 779 - Chromium

Paine Connecticut
Geology by Percival - get
Shepherds = p 16 - 97
p 98 114 118 122
124 135 137 161
170 183 197 203
235 280 473

Paine Mass - Geology of Mass -
52 - p 53 54 55
399 296 347 348
359 360 361 363
369 - chrome

Burns Tysons 2nd Rep
Geology Maryland
p 55 56 - 66 Chrome
67 68

50 — 50.

75c — 250.

24.
8.

107.
60
75
25
25

292.
160
12
12

476.

71.
8

568
476

92.

71

710
476

234.

Notebook, N-90-01-04.3

This notebook covers the period January-December 1890. All entries are by Edison. At the beginning of the book is a list of iron mines in New York, New Jersey, and Pennsylvania. The book also contains drawings of the phonograph and the electric railway; notes regarding the technical and commercial development of the electric light, including notes on the contractual arrangement between the laboratory and the manufacturing company (possibly the Edison General Electric Co.); lists and drawings for an ore milling operation; and an enumeration of salaries and other operating expenses at the West Orange laboratory. There are also hypotheses on conductivity and resistance and notes on filament experiments. The front cover is labeled "#581." The inside front cover is inscribed "#581 T A Edison Jan 4. 90." The pages are unnumbered, and the book has been used in both directions. Several pages have been removed from the middle of the book. Approximately 125 pages have been used.

XE-172

#581

N-90-01-04.3

Ta Edison
Jan 4 90

Iron Mines etc

Potter Mine 4 2/3 miles N 40°
W from Fort Ann near Lake George
Washington Co NY
Operated John T Harris 1880
who raised 12 172 tons sent to Canal
8 miles at Fort Ann & thence to Pa
from descptn in Vol 15 US Census Rept
on mining ~~[illegible]~~ p 105 immense body
lean ore on side walls
Mt Hope Mine 1/2 mile NW of Potter
Wkd 1881 by W P Ostrander & Co

p 108 says Immense masses titaniferous
ore near old Village of Adirondack
and also near the lake ~~at~~ in Westport
Township & Elsewhere - See Emmons
in Geology 2nd District p 244

over

also paper Reprinted from 32nd annual Rep State Museum Natural History Albany March 1880 by Chas, E Hall. describes these deposits. He says Titaniferous ores belong to upper Laurentian (Laboradite) series while Magnetite ores belong to lower Laurentian.

New Dorp Mine Staten Island -

Serpentine = Limonite, Contains:
39 pct. Fe - 1.91 SesquiO Chromium
0.55 Nickel Sulphide 0.17 Cobalt Sulphide

Northampton Mine Pa - (Limonite)
has 0.14 SesquiO Cobalt
Most all mines have from 0.1 to 0.5

Beyond Cornwalls Mine in Laurentian is Dillsbury mine. Near Cornwall is French Creek - St Marys PO mine - Jones mine, Wheatfield Mine, Fritz Island mine - all Magnetic.

NJ Mine owners or lessees

Crane Iron Co

Randall Hill -

Dalyrimple -

Kispaugh

Hill.

Glendon Iron Co

Hibernia

Teabo

Cooper, Hewitt & Co.

Union Church

Samson

Charlotteburgh

Davenport

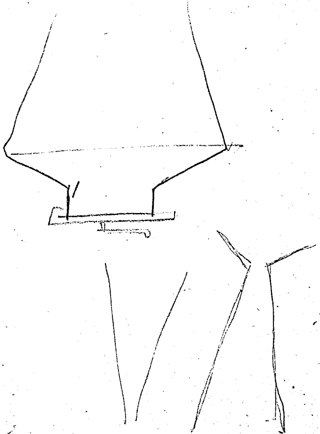
Pitney

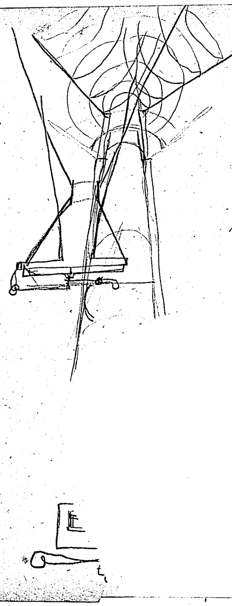
Ringwood

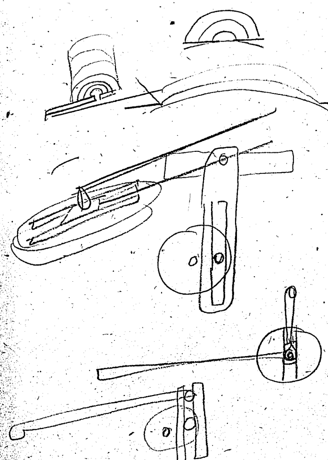
William Carpenter Mine

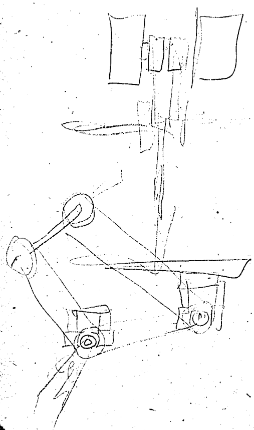
Pequest

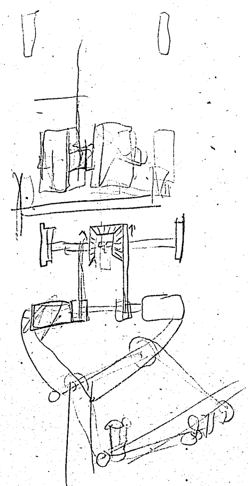
[illegible]

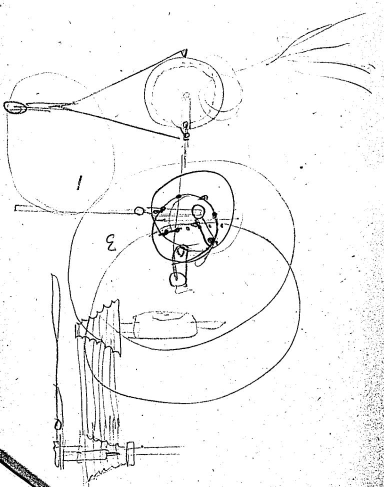


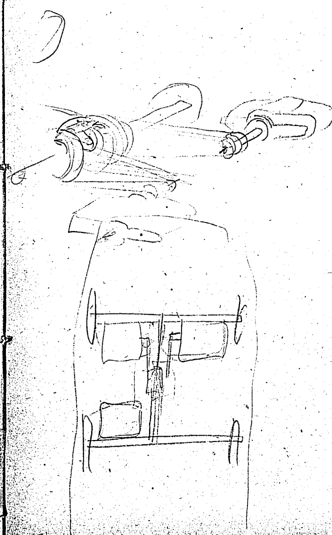


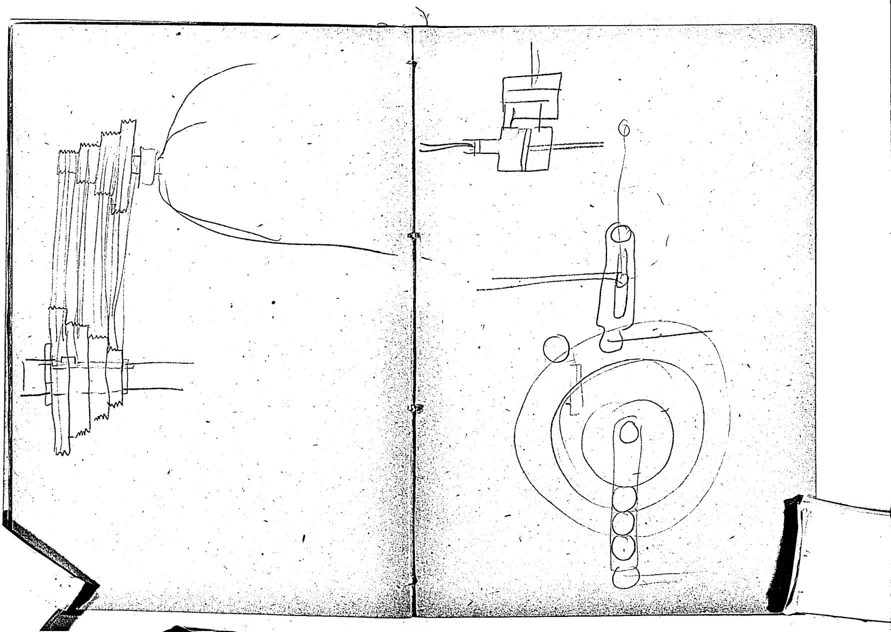


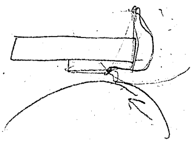


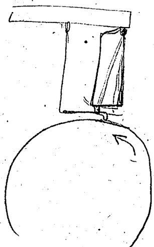


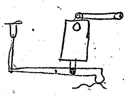


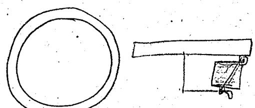


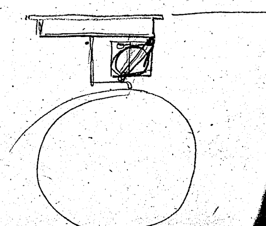


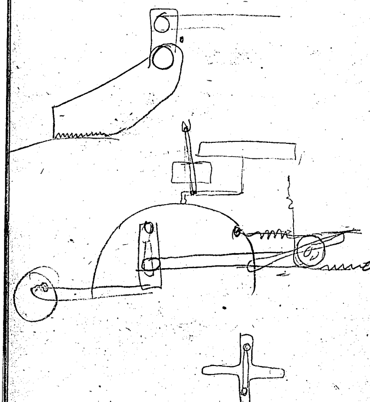
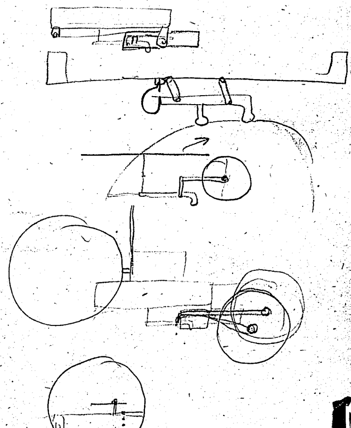


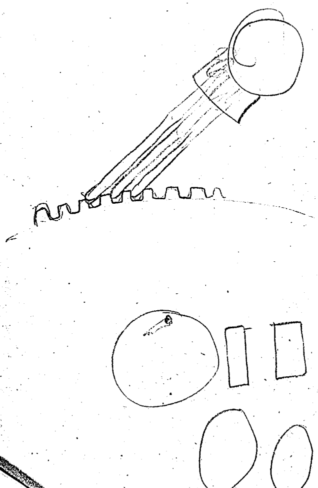


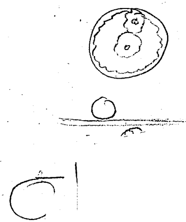


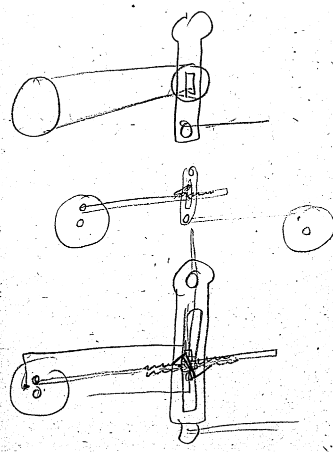


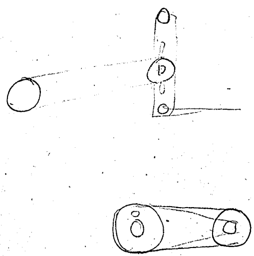


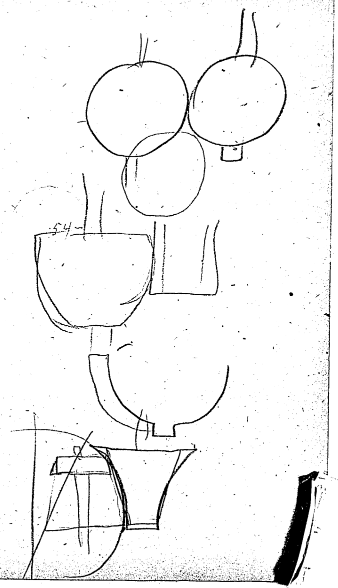









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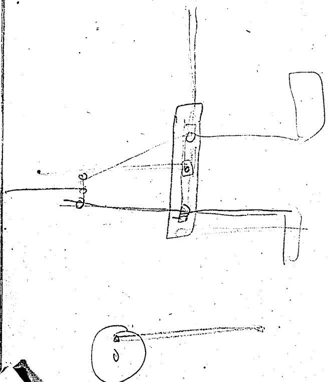

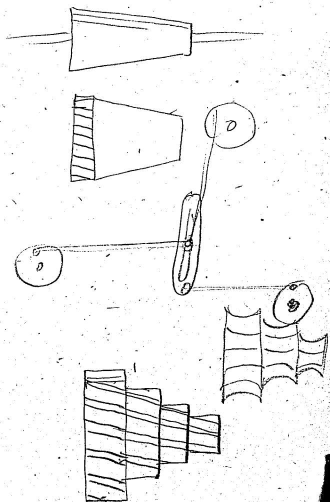

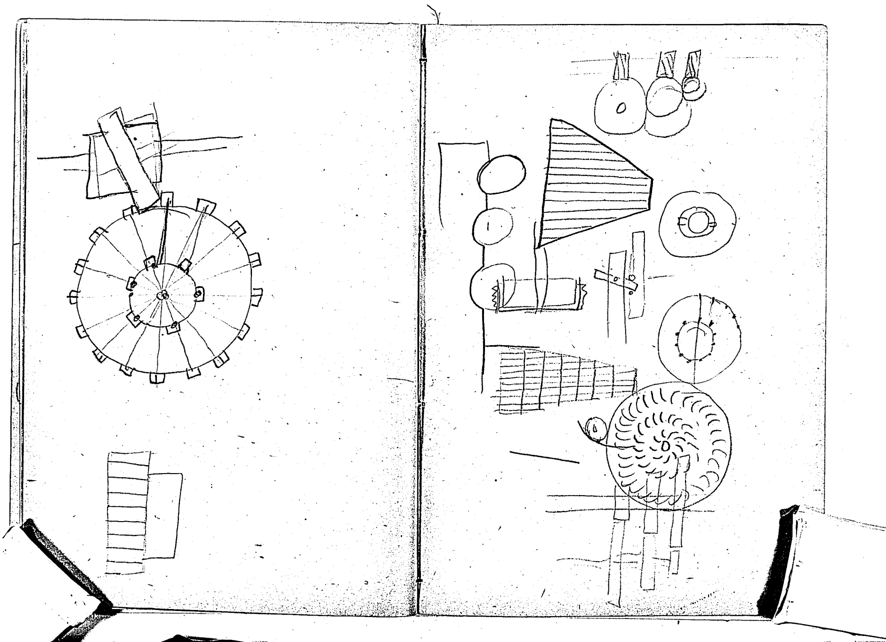

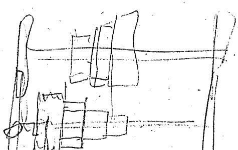

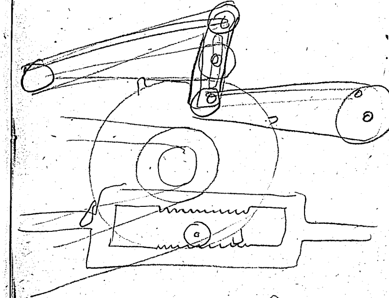

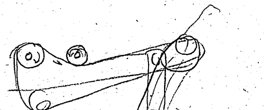

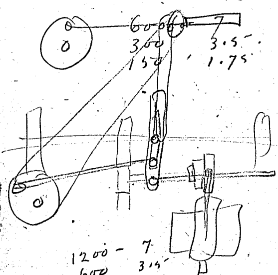

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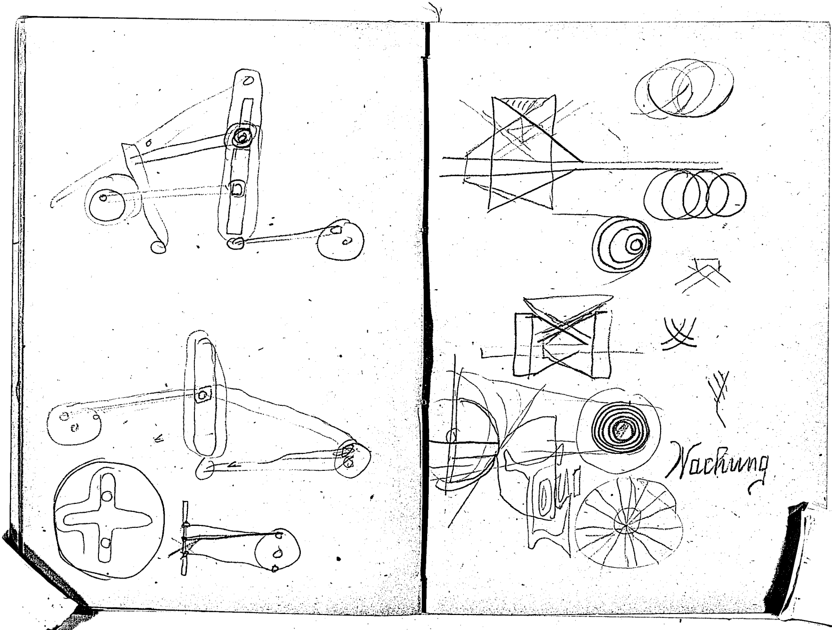
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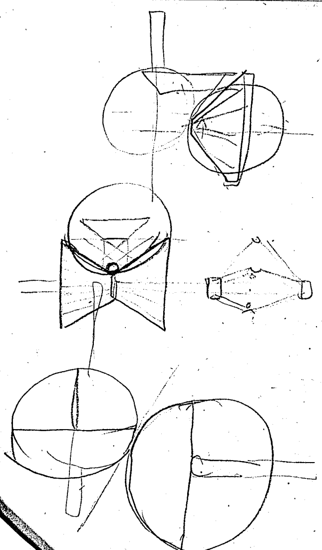

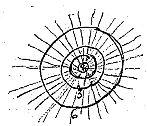

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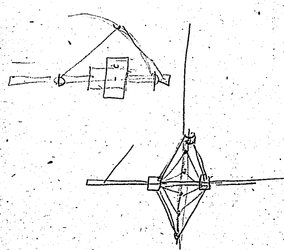

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Office Boy —	
Ebdell.	800
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Freddy.	600
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Fred Ott	1200
Kayser	1200
Gouraud	1100
Wurth	1200
Thomas.	1200
Walker	1100
Engineer —	1200
Atwood	1800
3 workmen	3000
Chemist	450
Dixon	1500
Shultzberger	1500
Aylsworth.	900
Laborer.	450

16 | 23600
3000
28600

Coal.
Tax
Gas
Telegraph
Supplies
Lamps
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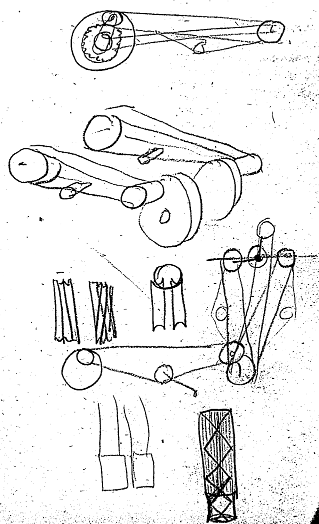

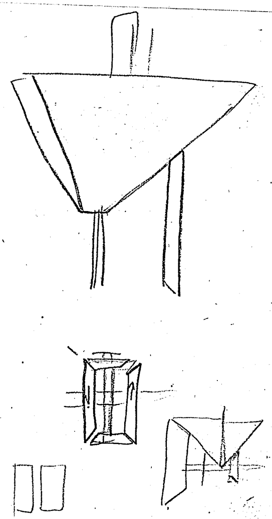

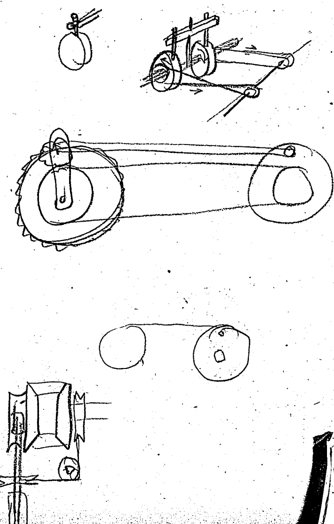

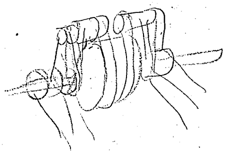
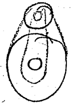
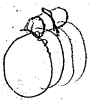
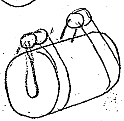
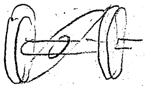
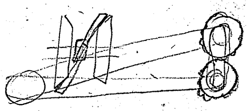
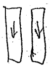
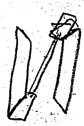
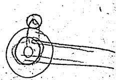
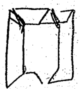
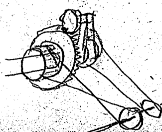

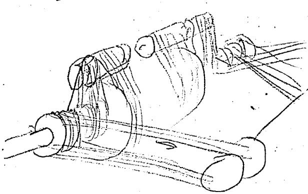

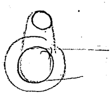

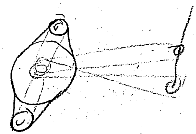

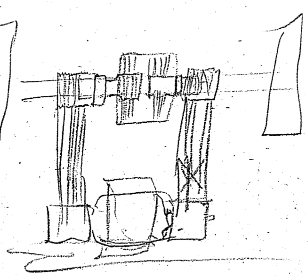

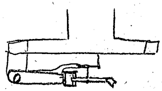

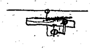

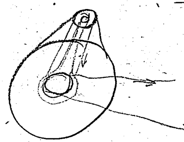

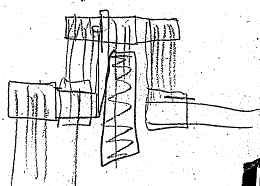

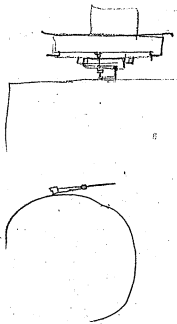

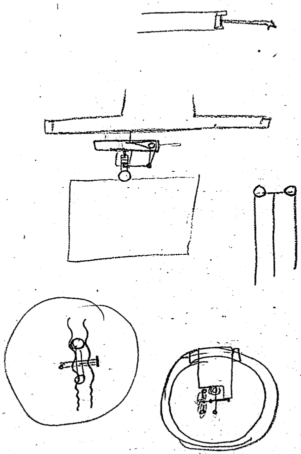

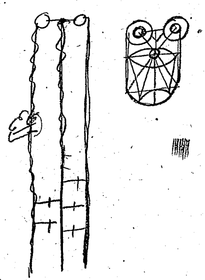

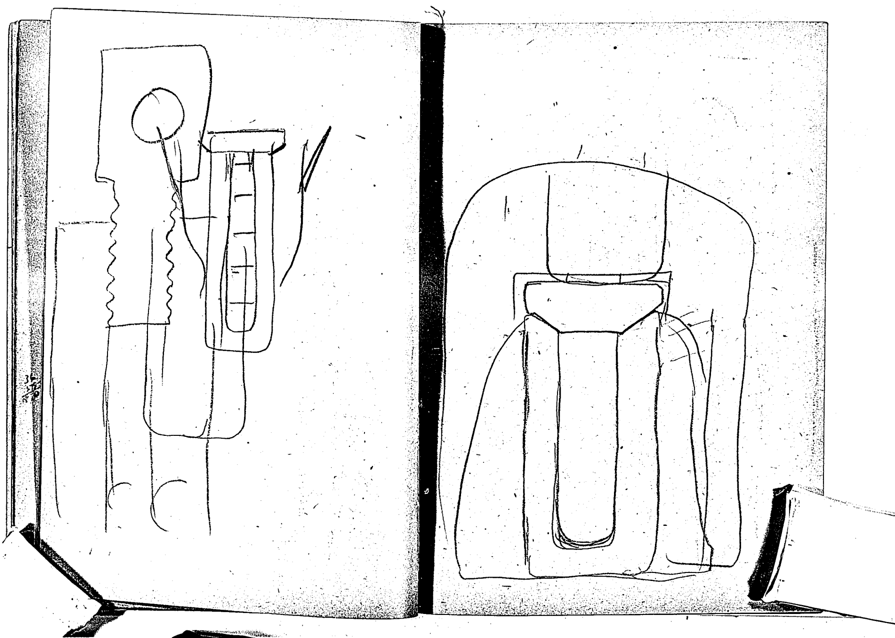

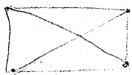

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Construct Dynamos for Compdolui purposes at 1/2 the Cost of present Machine —

Increase the present Lamps from 240 C per horse power to 320 without any more Cost per Lamp + capable of used with ~~the same amount of copper as the present 240 Lamp~~ 20 pct less copper per Lamp than at present

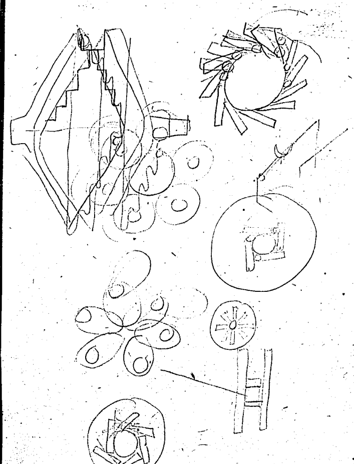
To Eradicate from the present Lamp without diminishing its life or economy the defect of gradual ~~drop~~ Loss of CP to an Extent greater than any Known Lamp and in the Case of 20 per hp The average C.P. for 1000 hours

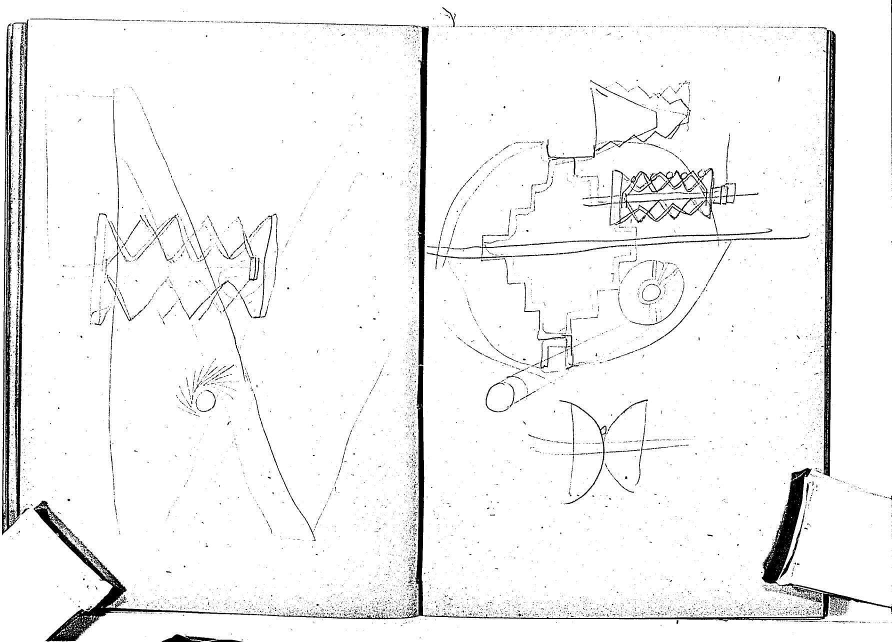
not to be exceeded by any Known Lamp - higher than ~~14~~ higher than 14 per hp —

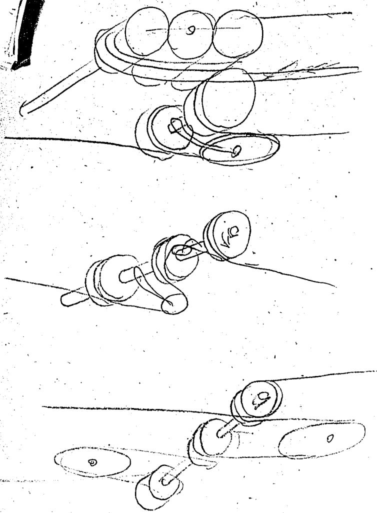
To diminish the Cost of ~~present~~ Lamp to 16 Cents —

to Make a 20 volt 20 Cp Lamp ~~Equal~~ superior in respect to economy CP & life to any 16 Cp Lamp Known

To ~~devise a complete system~~
of ~~alternate~~







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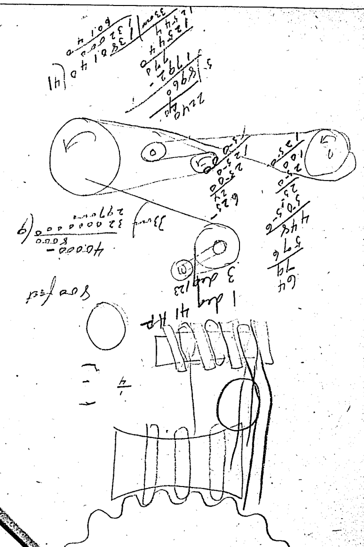
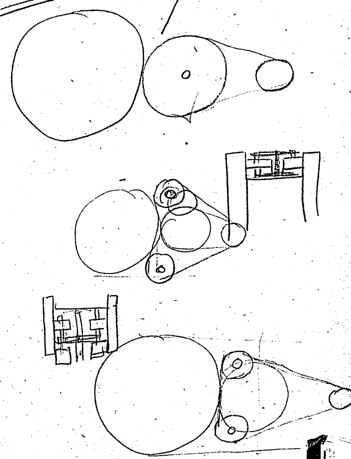
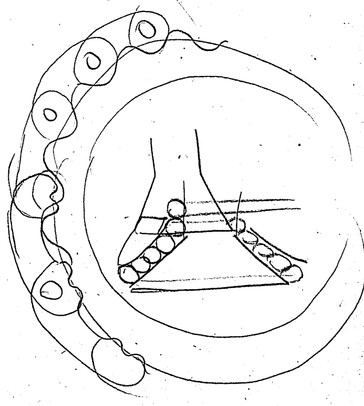


ERB Dec 26/90





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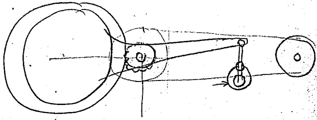

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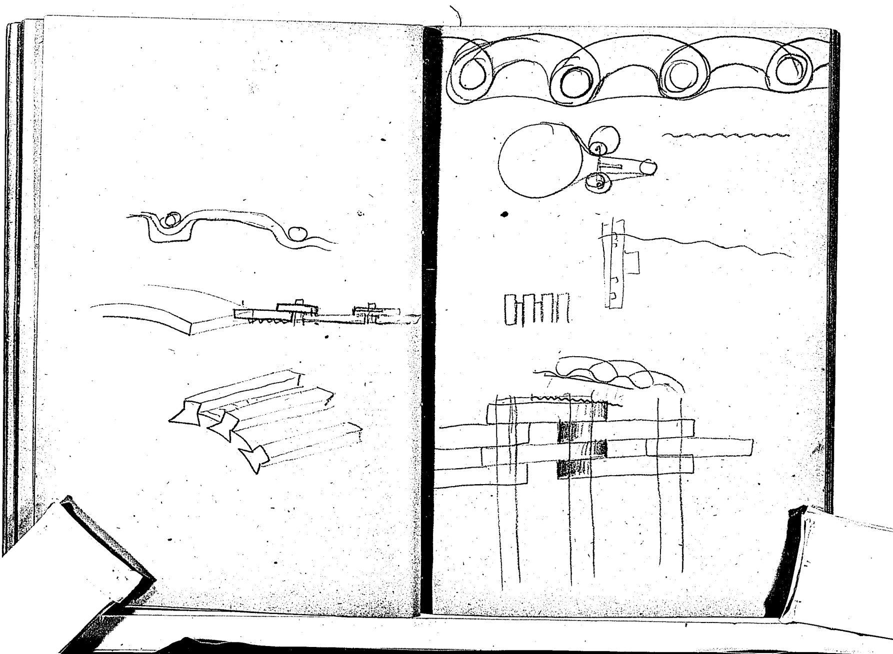

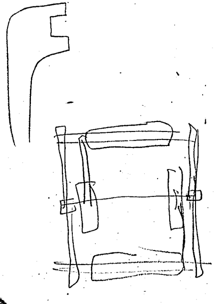

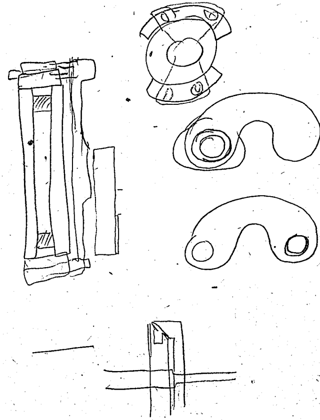

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Tilly Foster Mine

Warrington
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265
50
315
85
45
445

20

Stripping 3
preparing 4
Repairing Conveying 3
Mining 30
Blockholing 10
Loading 10
Repair Drills etc 3
Supt 3
RR – 1/2 output 4
Feeding Crusher 1.5 men 3
Repairs 3
Repairs 4 small C. 3
Wear + Repairs rolls 5
Belts 2
Sieves 3
Magnets 2
other Machinery 3
in Mill. 12 men shift 4
Engines 30 men 4
Repairs Eng Boilers 2
Bldgs Repairs 1
Insurance Tax 1
Genl Expense 5
Oil Supplies 2
Coal 5
118.

Refining

Conveyer to Refy 4 men 1
Engineers etc. Eng room 2
Wear Repairs 1
Rolls wear 5
Sieves 3
Belt machine 3
1/2 belt men 3
Genl Labor 3
Oil Supplies 1
Loading 3
Genl Expense 3
Coal 3
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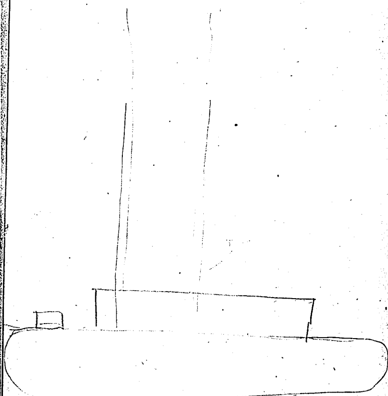

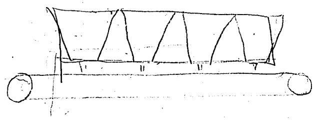

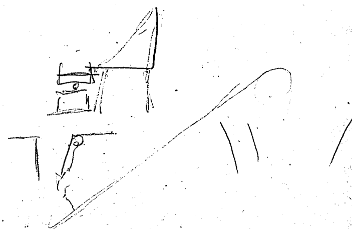

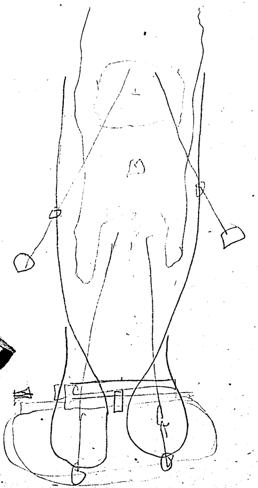
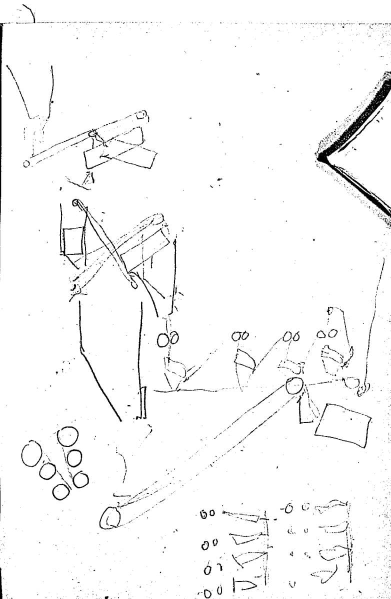

[THIS BOOK WAS USED IN BOTH DIRECTIONS.
THE FOLLOWING PAGES WERE FILMED FROM
THE BACK END FORWARD.]

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522 500
271 400
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260 500
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522 500
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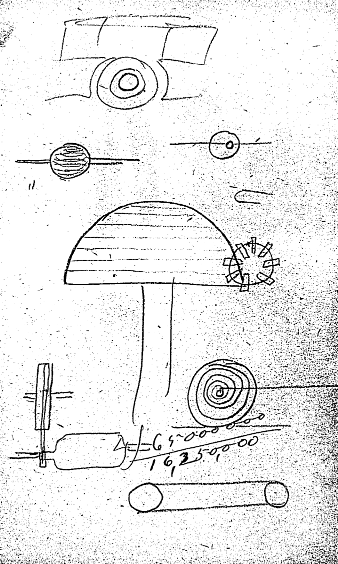
26
900
4

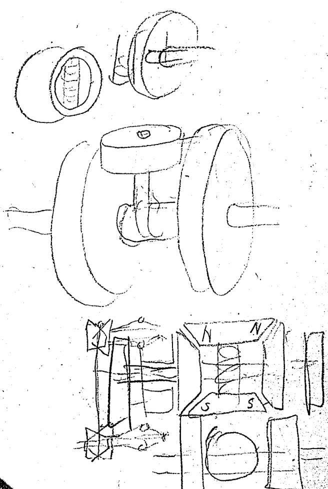
65
5
325 000
13
338 000

251 000

365 000

28
900
252,00

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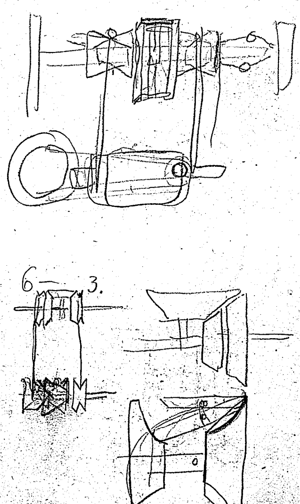
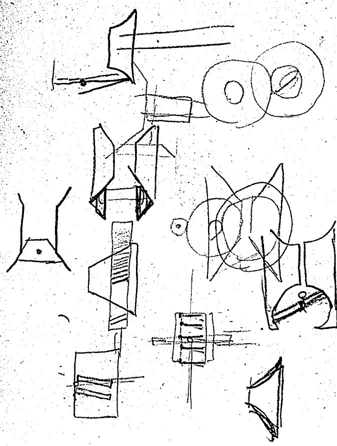
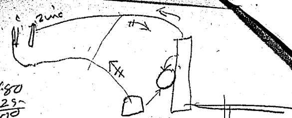
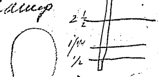

6 — 3.



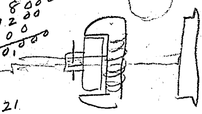


1.80
125
900
360
180
225.00

5 — Meldrup



3600
125
8000
7200
3600
440,000

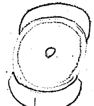


36.
125
36

21

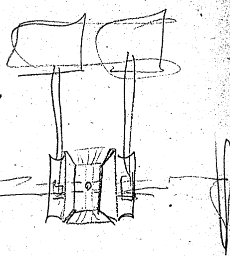
1 inch — 32
32
64
96
1.024 —

7



10 - 9.6 — 1 hour
1/4 inch

5 1/0



8)270
34

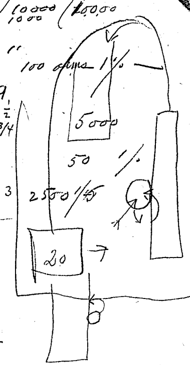
3 inches

1000 ohms 1/4 Volt

83 Melgms 00025 amp

4)373
.932
900
838

31
31
31 500)10000 (100.00
1000
93
9.6

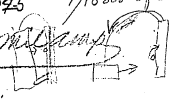


7	9	
6	9 1/2	
5	9 3/4	
4	10	
3	10 1/2	
2	11	
1	14	3
1/2	17 —	
1/4	20	
1/8	23	
1/16	26 -	
1/32 —		

2500 -

00075 — 4/10000 of amp

1000 - 1 Mil amp



373.

120
12
24
12
144

165500.

365
200,000
730,000000

365

65
4
260000
45500
1600
307,100
65

65
3
195
112
650
45350
731

35

472500
307000
165,500

315000
1000

472500.

12
14
120
28
14
168,

312
2
624.

34000
6500
6
39000

365
3
1095

522
307
215

36
522
338
184

365
200000
73000000 h

63000000 ~~1~~

364,000000

315000
150
15750000
315000
47250000

~~maximum load~~ —
~~100 000 — lights averaging~~
~~3 hours each daily~~ —

~~300000 lamphours~~ —
15 per hp basis
100.000 Light Station. Costing
Say 1.200 000. —
100 000 lights actually burning
at one time in Dec at 530 pm —
average during year. 2 hours.
365 days 2 hours daily —
or 73000 000 Lamphours which
on gas basis is 365 000 Ms
If sold at 150 per M the
average price gas — gross recpts
\$ ~~472500~~ 522 500 — If we assume
that Operating Expenses are
65 pct then the same would be
338 000 leaving ~~165500~~ 184 500 profit;
which is say ~~13 1/2 pct.~~ ~~This is~~
15 1/3 c div

7500
15
37500
7500
112500

7300
15
36500
7300
109500
15
7000
105000

472500
245000
227500

5
25
9
225

52
4
208
36
244

520
7
3640

20 per hp basis —

Cost ~~station~~ for machinery
1/3 less for building & ~~ground~~
ground 1/4 less for installing
1/4 less Underground 1/5 less
or about 300 000 less
Making investment $900,000.
The general Expenses will be
about the same. The actual
Expenses for coal oil water
~~insurance will~~ will be 1/4 less
or say the operating Expenses will be
52 per cent of receipts,
as the receipts will be the
same as in the other case
~~to wit~~ $ 522 500 ~~472,500~~ then deduct
Say 271 000 ~~245 000~~ leaves 251 000 ~~227 500~~ profit
or about 28 ~~25~~ pct dividends as against
15 1/4 ~~13~~ with 15 per hp —

978

134000
2
268000
365
134000
160800
804000
978,2000 900000

1340
365
670
804
4020
489,100
810,000

268000
5
1340000

365000
271000
94000

670
15
3350
670
10050

315000
227000
88000

900

680
15
3400
680
10200

17000
000

65

6700
20
134000

365

If we now reduce the price to 1.00 the recepts will be 271 000 ~~227 500~~.
$365 000 ~~315 000~~ Expenses
leaving 94000 ~~88000~~ or say 10 1/3 pct ~~say 9 1/2~~
pct div

But If we have the Original investment of 1200.000 and assume that the reduction from 150 to 100 will increase the Consumption then the Lights will be 134000. giving gross annually on 2 hour bases an Equivalent of 489 100 ~~978000~~ ~~thous~~ of gas at $1. gross recepts 489 500
as the general Expense gas other ~~is same~~ ~~There to thes~~ with Exception of Lamps
for a 100 000 light 15 per hp station. Then the Expenses will be 338. with 12000 ad for lamps + 3000 for metering — Total

120
11
120
120
1320

1200
12
2400
1200
14400

489
353
136

16

60
489
73
562
353
209000

489
48
537
353
184

338
15
353 Expenses recepts 489000
gives 136000 profit or say
11 pct at 125 recepts be 609250
profit 256250, or say 21 percent
or if sold at 110 give same div
15 perhp sold at 150

~~489000~~
125
2445000
978000
489
609,250

1200
22
2400
2400
26400

16

1200
21
1200
2400
25200

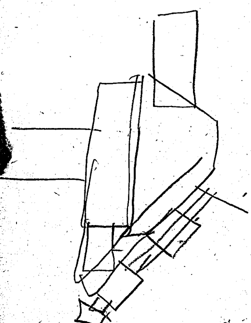
609250
353000
256,250

1200
15
6000
1200
18000

Co to pay for experiments in the regular method of charging at Laboratory ~~but the total~~ yearly

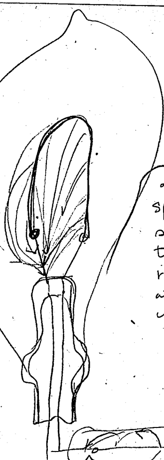
3/4 ~~of the total expenses of the~~

The whole of the Expenses of the Laboratory is to be paid by the Co and 3/4 of all ~~the~~ work done at Laboratory shall be for the Co, The other 1/4 shall be free to Edison in lieu of interest & on inventions originated and ~~produced~~ adopted by the Co. and made use of Edison shall get 1/5 of the benefits accruing to the Co — to be mutually agreed on or submitted to arbitration, and a new determination of benefit, may take place at End Each year if Either party desire



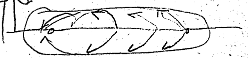
Boil SO_4 in 10 bulbs then
wash in distilled -
pass current through fil in
strong SO_4 - with platina
weight on fil & Weston clamp
meter - do it in pump
room if ok make 10
Lamps with highest amp
move fil around while
doing it -

Make Lamp on spoon phos
Run up to get red blue in
globe & then to get the
black spot near blue clamp
& then notice its gradual
spread over whole of
Carbon



Try 5 Lamps
spoon phos -
heating bulbs
before wkg fil -
heating again before
sealing & putting
carbon at red [illegible]

2nd 5 Lamps
spoon phos - get
sealed tubes bring
to visible red
run 1/2 minute
at this. then work
up quick -



Try Lamp ~~that~~ has run on a
curve but not blackened with
HCl & see if scale comes off -

Try 5 Lamp Exhaust spoon phos, then 6k Vac ~~& heat~~ take lamp off & heat bulb very hot just as if you were to burn off scale of block & ReExhaust,

Have Deshler pick out 20 Lamps each having same life - say 100 200 3 5 7 10 15 20 30 & 4000 hours not any selected -
Then I will study each set for peculiarities

find drop of Cp on M3 -
Selected & specials -

Try dip fil in ~~oc~~ 17 then giving up with 40 Lamp bank - ditto dipped sugar do Carbut in Chloro & pidi -

Have Freddy preliminary 50 fils up to 650 fahr in Charcoal & make Gox 8 hours - Take out dip 17 at 100 - then send to Matt - at same time Run the 64 etc we last squirted through in Charcoal, some without Charcoal take out

Load Nickel box up as
follows box with 10 + 005
~~Last squirted fibres~~ 1/2 of each
in Charcoal 1/2 without,
also box with 50 fibres Reg
bambo another box or boxes
50 in charcoal - another
box 50 tied together,
Run to 650 in 8 hours
take out all ~~Reg~~ +
Examine if squirted ok put
back ~~if~~ others ok -
take 15 of the 50 ~~50~~ with charcoal
+ put them back -
Take 15 of the 50 without
charcoal dip in 17 at 100 deg
dry and put in charcoal.
Take the bunched ones
dip dry ~~& send~~ to Matt also the
other 2 35s -

If Castor oil acts on phos it won't in the new spoon device -

$$15 \,\Big)\, \overset{\substack{300\\500}}{50{,}000} \,\Big(\, 10000$$

$$15 \,\Big)\, \begin{array}{l}500\\ \underline{45}\\ 50\end{array} \,\Big(\, \begin{array}{l}33\\300\\9900\end{array}$$

1000.

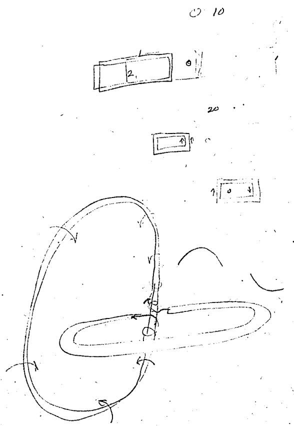
$$\begin{array}{r}10000\\ \underline{10000}\\ 100000000\end{array}$$

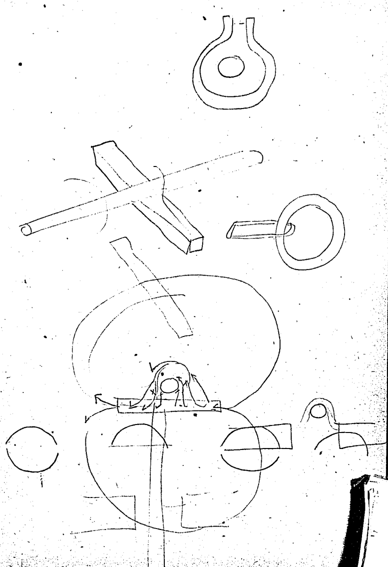
$$\begin{array}{r}200000\\ \underline{5}\\ 1000000\end{array}$$

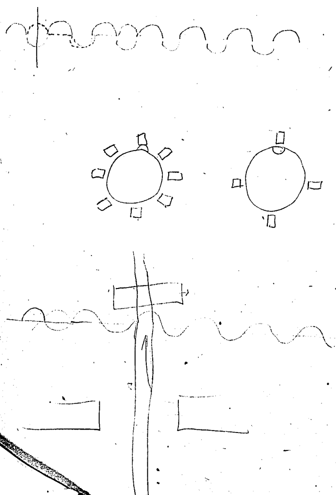
33

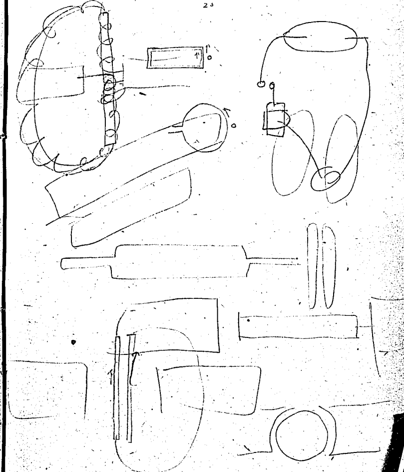
$$\begin{array}{r}365\\ \underline{200000}\\ 73000000\\ \underline{5}\end{array}$$

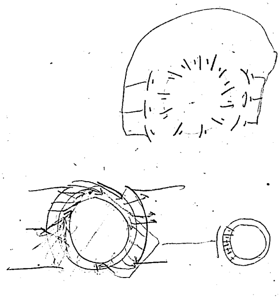
$$1000 \,\Big)\, \begin{array}{l}365000000\\ \underline{3000}\\ 6500\\ \underline{6000}\\ 5000\\ \underline{5000}\end{array} \,\Big(\, 365000$$

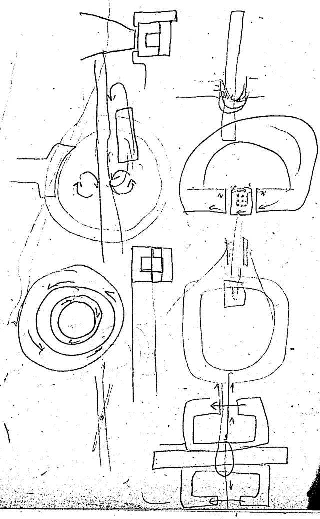

10
2
20

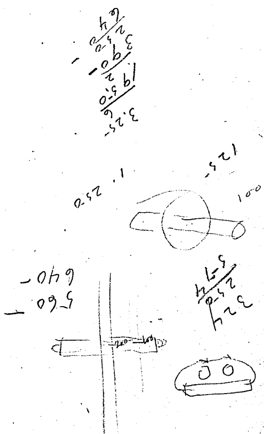












Doubling the number of lines of force cut by a wire whereby the amperes are doubled in a wire - doubles the number of whirl lines ~~or what is the same thing~~ and ~~as the ether offers whose not ...~~ ~~as resistance to motion the lines~~ without increasing their velocity - or if we study balloons it must double ~~their amplitude without~~ ~~increasing their number~~ in fact there are probably no lines but the waves double in amplitude

If one turn of wire encircle a bar of iron, there will pass into it & be condensed a certain number of whirl lines from the Copper ~~say~~ if two turns - there will be twice the Condensation with any turn, the number of condensed whirls will be in proportion to the iron enclosed by the wire -
two ampere turns: double the Emf of the whirl lines just as 2 turns on a Dynamo double the Volts

In an iron wire carrying a current a part of the whirls are condensed in the iron itself and thus retard signals — this is not so with Copper —

In pure copper the molecules go with the whirl nearly — but not quite hence heat. If the orbital path of the Copper molecules are disturbed by foreign molecules vibrating in different times collisions occur & more heat is given out and there is a fall of pressure due to the work absorbed. If the Copper molecules vibrated or moved with the exact velocity of a wave in the Ether there would be no collisions & no work no heat & hence no resistance —

Resistance of Electric Conductors more or less is a function of the orbital velocity or vibrating period or perhaps elasticity of the rigidity of the aggregated molecules of the Conductor — the nearer a metal approaches the Elasticity of the Ether the better it Conducts

All Combustion between Molecules take place with the same velocity as light as is a function of the speed of stresses through the Ether.

In batteries where the Combustion gives 1 Volts, then where the Combustion gives 2 volts twice as many individual molecular Combustions take place in the same time - or if this is not the Case the amplitudes of the whirls are doubled. owing to the double amount of Energy set free at Each given molecular Combustion

as iron is a conductor like Copper but it molecules ~~being~~ bonds being held together with an Elasticity less than the Ether + less than Copper the latter is the better Conductor, therefore magnetic Condensation of the whirls of

Copper must be not ~~a~~ molecular friction of the iron but a Crystallographic or other larger & more sluggish frictional nature — while Magnetic lines may have the same velocity as light when propagated through the Ether. it is not so with iron

---

~~2nd Theory~~

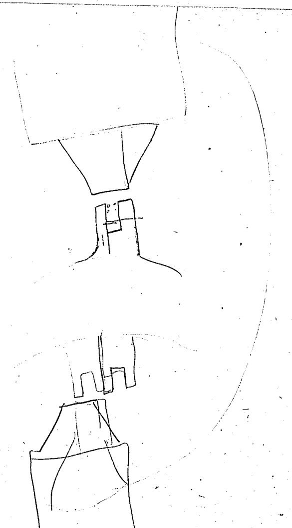
~~All matter Condenses ether on its~~

~~Crystalographic surfaces~~

The iron molecules are capable of motion in two directions on following the whirl when acting as a Conductor & one at right angles to this when the whirl passes into iron

Reversal causes the Energy
absorbed in starting the
molecule to be giving out
as heat hence hysteresis heat
Saturation is produced when
the speed of rotation Equals
the speed of the Ether wave
no saturation is rotation not
up to speed or lag—

permanent magnet is the
molecule up to a given speed
or amplitude + prevented from
dieing to Zero by the intervention
of matter which prevent the system
Coming together in Collision—
Carbon for instance (1c) Combined
Carbon, These lines of molecules
once set rotating make a closed
Circuit probably Williams + the more closed
the chain (1c) the lower the resistance the



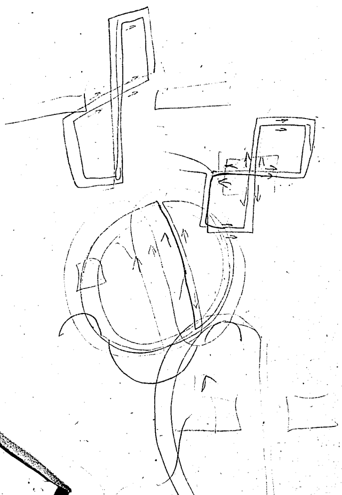
longer they will continue to rotate + eventually mutually react + rotation ceases in steel the rigid system produced by Carbon keeps these ~~Mo~~ molecular lines of circuits seperate hence they keep on without loss or diminution of amplitude of the iron circuit be closed -

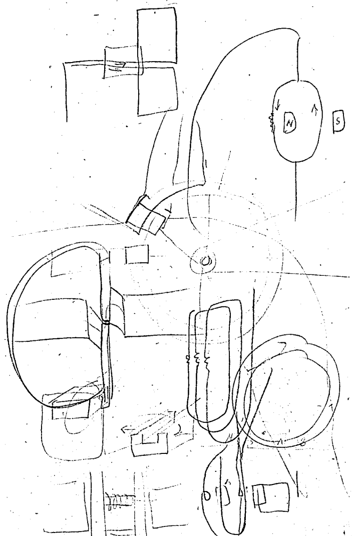
It may be the reason that so many stress lines can be packed in iron as against Copper is that ~~Iron~~ Copper forms but one Chain ~~of~~ or molecular circuit while iron has thousands + the whirllines thread the circuits in other words the magnetic metals have groupings in straight lines each molecular connecting with the other while non magnetic substances have no such property perhaps the, very opposite =

Some such action as this is implied by the lengthening of a magnet without alteration in its bulk—& that there is air space when magnetic is shewn by the sharp sound on breaking

---

Certain alloys of manganese & iron with 70% of iron are non magnetic hence this must prevent the formation of these molecular circuits of Cartagena iron particles & hence no threading = It also proves that individual iron molecules are not of themselves magnetic but the phenomenon is due to mutual action so that chains of molecules giving closed circuits can be had, or Ether surrounding them

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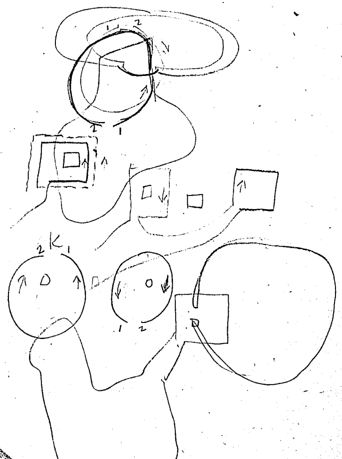

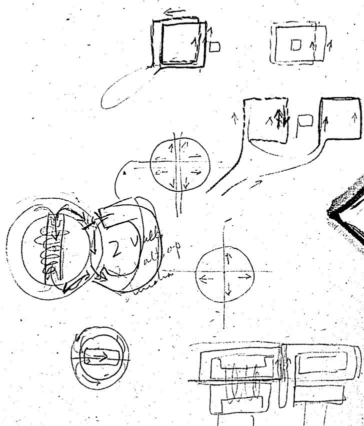

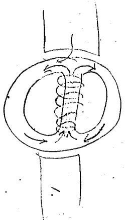

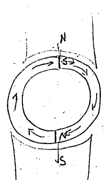
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N
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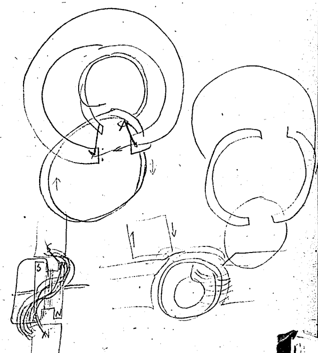
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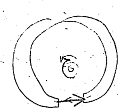

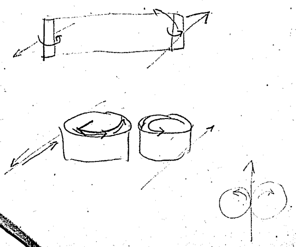

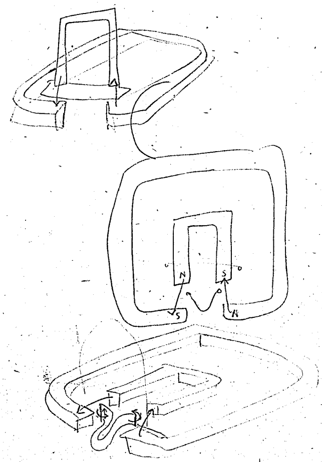
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S
S
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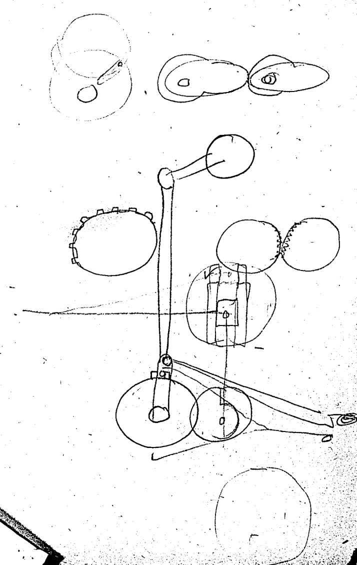
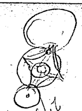
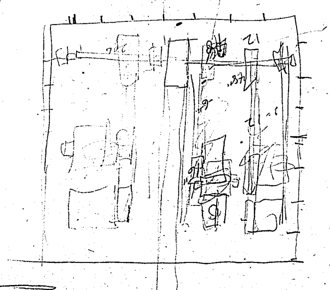
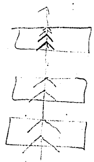






1.5
3
4.5

.15
.4
7.5
.5
2.25



Notebook, N-90-01-04.4

This notebook covers the period January 1890-March 1891. All entries are by Edison. The book contains notes relating to numerous mines and methods of ore separation for iron, copper, gold, and nickel. Also included are drawings regarding phonographs, generators, and electrical distribution systems. Near the end of the book are cost calculations for the North American Phonograph Co. The front cover is labeled "#582." The inside front cover is inscribed "#582 T A Edison Jan 4. 90." The pages are unnumbered. Approximately 110 pages have been used.

N-90-01-04.4

#588

TA Edison
Jan 4. 90

Sudbury - Trenton - Cu Fe Ni. ore plant -

Notes -

Jany 4 1890

Also Gold + Ni Cu

Cu Au Ores -

Manhès expmts conctg Fe Cu Matte to get rid
Fe Min Res US 1883 p 540 - same page
Garnier, Bessemerizing Nickel Matte

Eugene Hermite Rouen France.
puts Ni Cu oxide from Matte in closed chamber
rotateable, puts ammonia in under pressure
60 lbs sqr inch, amount proportion to ore
rotates 30 @ 60 minutes - after settling,
decants - reammoniates if necessary
Liquid subjected to Electrolysis in closed
Vessels containing Electrodes Carbon +
Cast iron, metals in Solution collects on iron
Caustic Na added to solution lower resistance.
Ammoniates of Cu + Ni formed - Containing
Vessell may be of Cast iron as ammoniates
of Ni Cu dont attacket, further descript see
London Mining Jnl + also p 542 US Geology
1883 —

dead roast powdered matte to form Sulphates & then dissolve & oxidize Fe by blowing in air or use bleaching powder to oxidize Iron & form a Insoluble Ferric Sulphate,

dead roast powdered matte to form Sulphates & then dissolve & oxidize Fe by blowing in air or use bleaching powder to oxidize Iron & form a Insoluble Ferric Sulphate,

---

Rivot & Phillips -

Dead roast & while white hot put in bars of iron to reduce O of CuO

American Encyclopd 693 article Copper

Edison -

Dead roast reduce Cu to metal state Stir in Lead to form $CuPb$ alloy the Fe or Ni not alloying at the low temperature - also try antimony

See what Manhes process is -
also Doetsch Rio Tinto process
persul Fe.

In 1882 US Geology says there is a nickeliferous Limonite ore in Michigan which has produced wonderfully good iron p 416 — also states Iron ore at Antwerp NY contains Ni.

M S Cheney & Roberts—Mass Inst Techn method estimating Ni in pyrrholites & matte phos Ni Completely soluble while phos Fe almost insoluble in acetic acid in presence of Excess phosphate soda — US geol 1882 p 417 —

See Ni process Eustis & Howe of Boston - Trans Amer Institute Mining Engrs 1882

1882 US Geolg - says immense deposit pyrites good for SO_4 & Clay & Coosa Cos Ala some containing 10 pct Cu not very accessible

1883 US Geo says there are within few miles of Tilly Foster Mine immense deposits Iron not yet developed -

Blue Saphires found near Sparta, Franklin & Vernon = Sussex Co. N.J.

Magnetic Iron Sand West shore of Lake Champlain -

An Aluminous Magnetic iron ore occurs near Peekskill NY self fluxing not worked immense deposit,

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Wurtz Amer Assn Adv S 1858 & Sillimans Jnl 1859 Report on N Carolina, Gaston & Lincoln Cos N. Ca ore Espclly abundant on Western Slope of Cross Mountain — Covered with gossan

In phillips Work Called Ore deposit says p 596 -

On north side Island of Michipicoten Canada cliff 300 ft high is a soft amygdaloidal bed containing Native Copper. Traceable some Miles - in this bed an attempt was made number yrs ago to work a remarkable ~~bed of~~ deposit of Native Cop - with grains native Silver dessiminate through gum composed of Hydrous Silicate of Nickel. - ore was stamped & Ni ore the Value of which not then Known washed away - leaving residue Metallic Ag & Cu Shaft was sunk to depth 12 fathoms but after considerable outlay wkgs abandoned

---

Get Wendt on the pyrites deposits of the alleghanies

Process by Sudbury ores -

Powder to 120 mesh separate pyrotite, then roast to make Calcopyrite Magnetic.
then put Ni + Cu Sulphides into brix seperately using Say 20 30 50 + 75 pct of fine 100 mesh Connellsville Coal - See if Sulphur all goes off as BiSul Carbon + there is Bricking - also bring up high to make Sponge flat it under Hammer also fuse - E

Have Dixon try following

Roast a Calcopyrite until all magnetic — then dead roast until all nonmagnetic then with fine coal or reducing flame again roast to make it magnetic

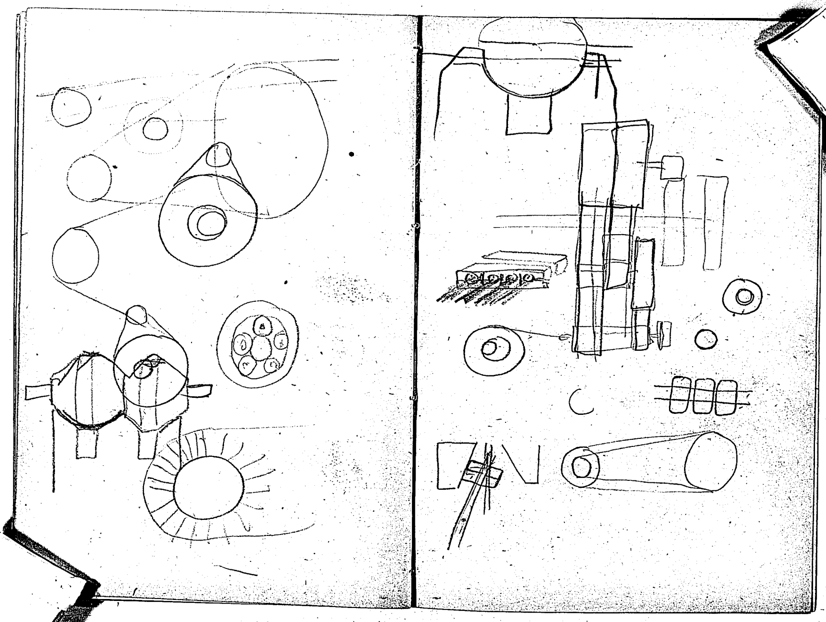
If this works can get a double twist on some ores & also roast Calcopyrite & Iron pyrites under same conditions see which becomes magnetic first or if Calco can be easily roasted to magnetic without effecting pyrite

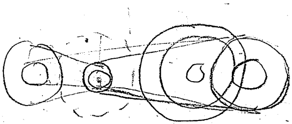
Nickel Mine Warren Co N Jersey
at Brass Castle mine named Witty Mine
operator. C F Staates - production in 1880
nothing -

Nickel Mine operated 1880 by
Dracut Nickel Mining Co - Location
Dracut Middlesex Co Massachusetts
product in 1880 - 13400 lbs —

Mica Mine - Broadway
Warren Co N J. named Broadway
Mica Mine - Operator J C Merrill
no production 1880 -

~~Black~~ Virginia Cop Belt. Ore Knob
Vir Gangue principally Magnetic pyrites &
quartz leaving Calcopyrite
1 pct Nickel in ore -





2½ to 1   6.

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33 / 300 (·9
297

L. 2.5 / .30 (1.2
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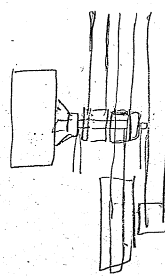
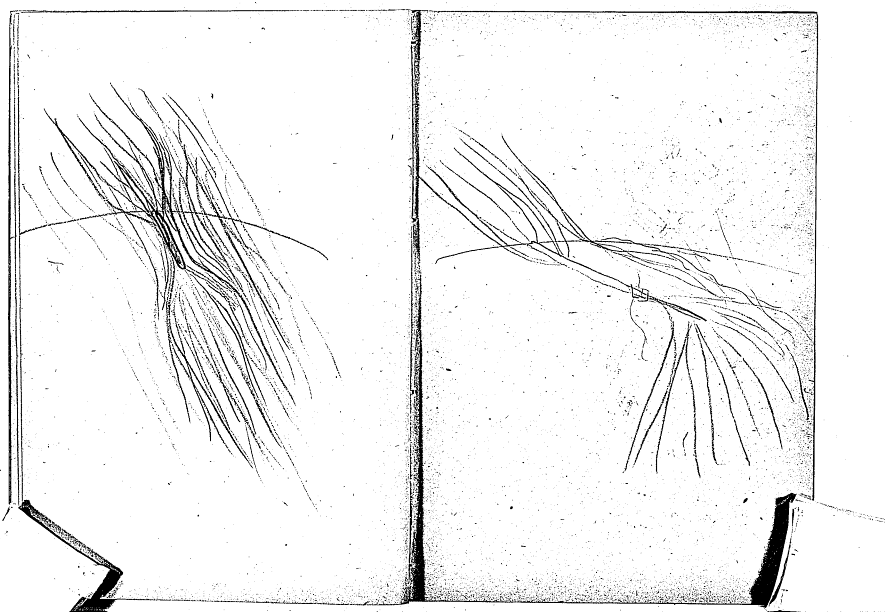
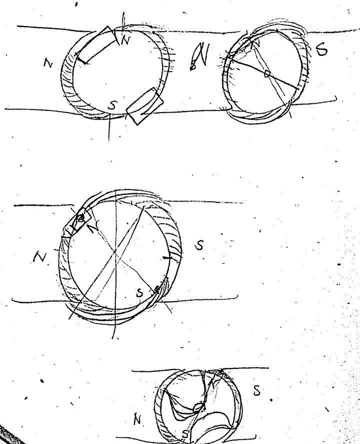
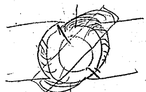
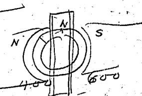
60 / 520 (8.





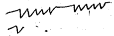


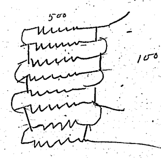




100 — 200 — 400 600 800

1000 1200





4000 — 1/2 —
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500 — 1200

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87.
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1200
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225) 1450 (6.4
1350
100
33) 330 (100
110
220.
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2.2.
450) 2400 (5.3
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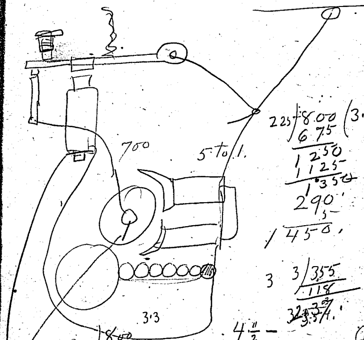

225) 800 (3.55
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13) 800
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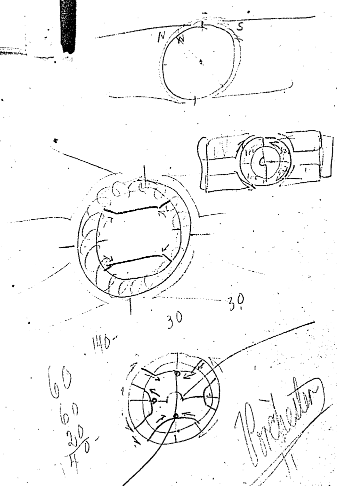

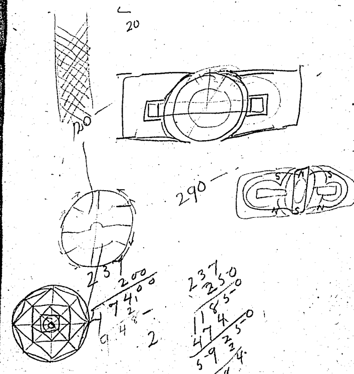

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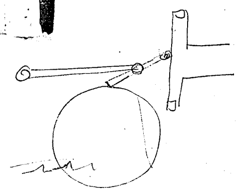
300 -



70
280
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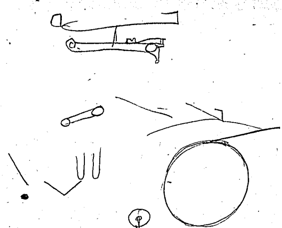
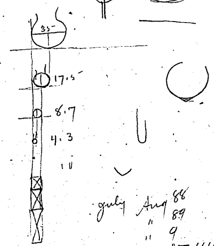
310

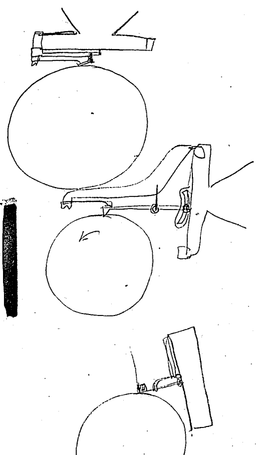
310

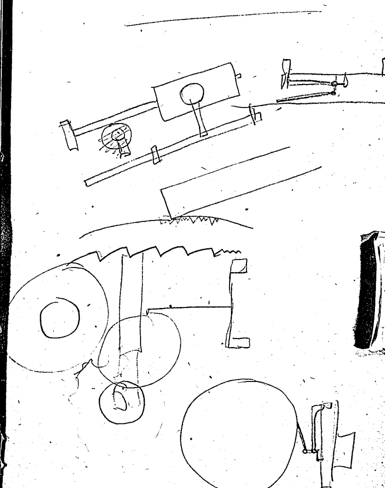


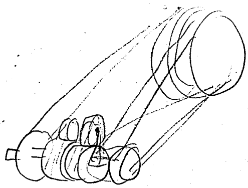


july Aug 88
" 89
" 9
" 1
2
3
4

41 months







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H. O
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18,
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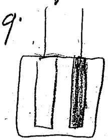
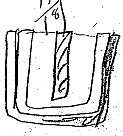
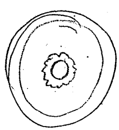
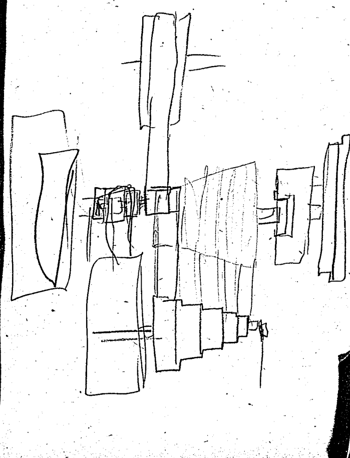


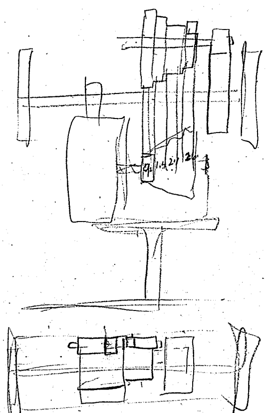
15
12
30
15 .01
18

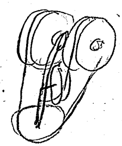


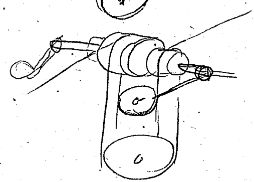
300
600
48 hp

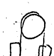


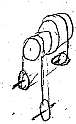












6/1. 600.

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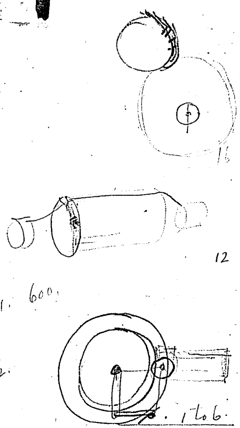

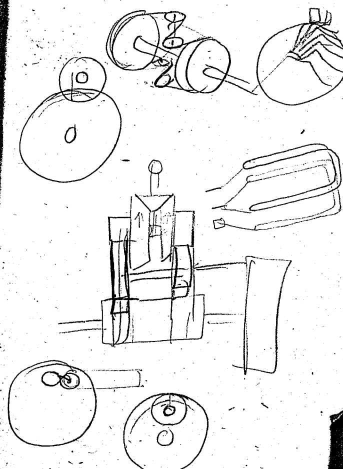

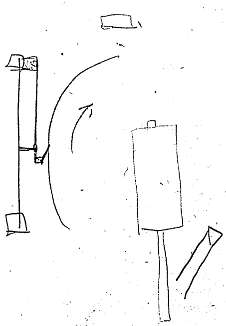

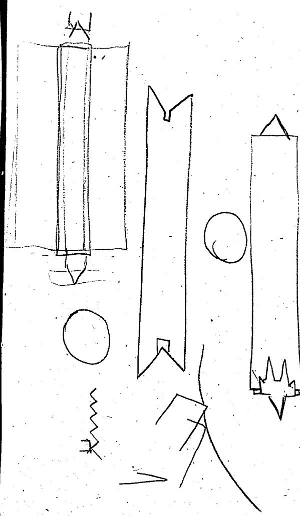

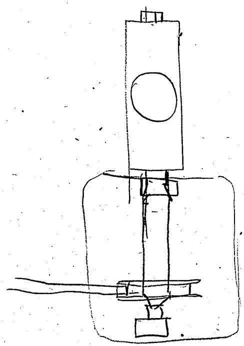

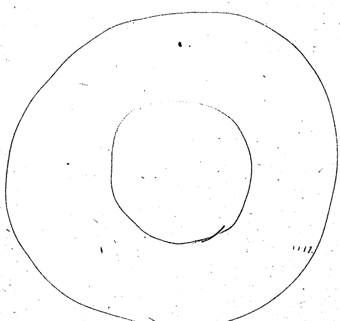

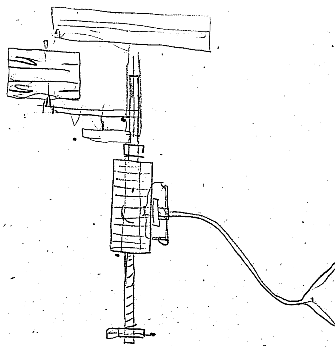

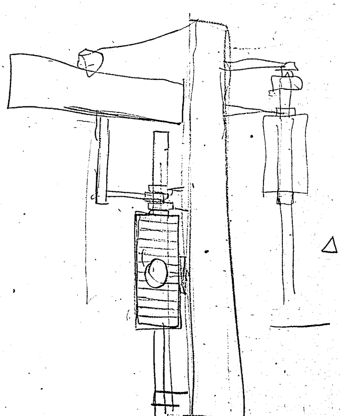

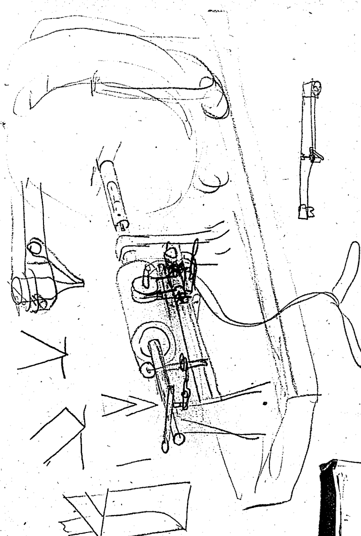

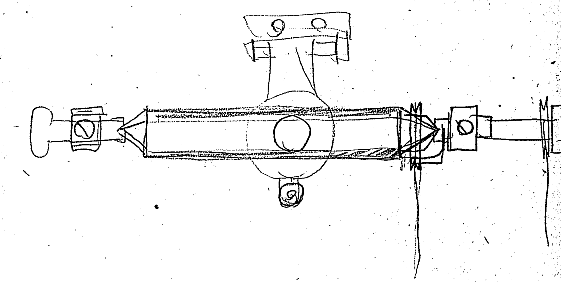

320) 1.00 000 (312   hp. 10—   mi 1
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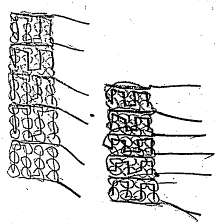
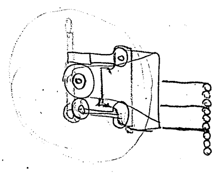
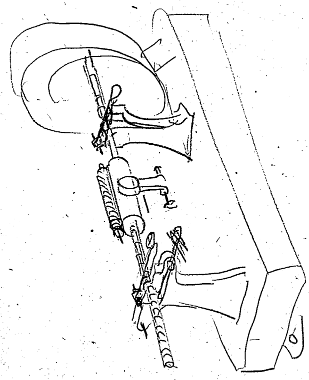






Mch 15 - 191

Iron Expmt,

Chloride Ammonia
Sulphate "
Carbonate "
Borate "

Sodium Amalgam -
Anhydrous Caustic Soda
Carbonate Soda

Lining Ladle with Marble make CO_2 which rushing thro Iron reduced CO -

Iron Expts   Mch 15 91

Mixture 1 pt Bichrom Pot — 2 Chl ammon
heating gives Nitrogen —

Sodic Nitrate —

Iron pyrites —

Sulphide Potash —

Cyanide Potassium

Sulphate Barium

Magnesic Sulphate Look out for water!

Sulphate Potash no water
Soda has H_2O —

~~Bisulphate~~

Strontia Sulphate no water

phosphide of Iron -

Urinum

Malybdenum , - Sulphide
also of Lead -

Arsenic

Tungston

Chromium

Cerium

Manganese

Black oxide Manganese
in pot also Crucible

Anhydrous Sulphate of
Iron at Faraday

Oxide of Lead – say Litharge
– large dose –

Baryta is sulphate Ba

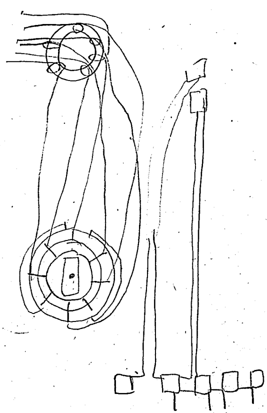
Baric Carbonate high heat to
Decomp –

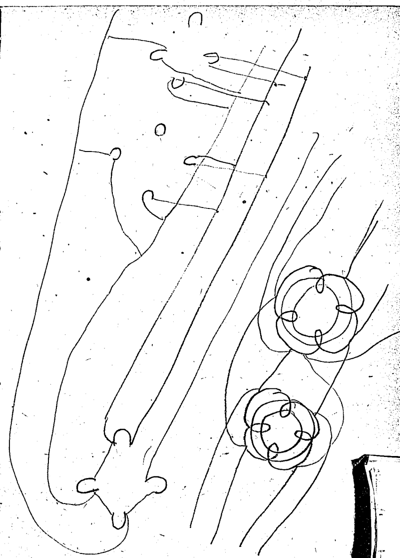
Zinc Sulphide –

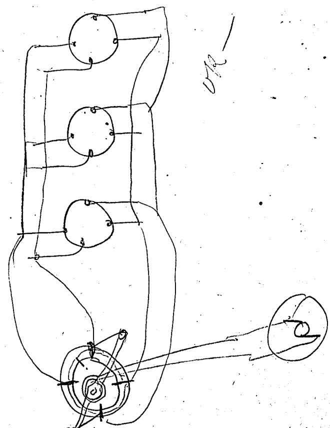
Oxide Zinc –

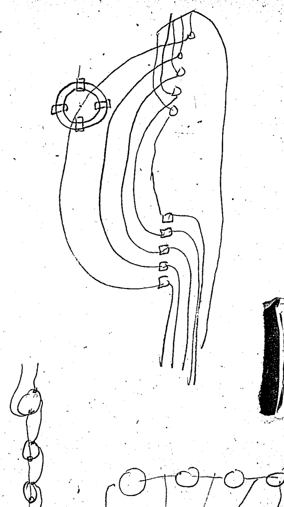
Nickel –

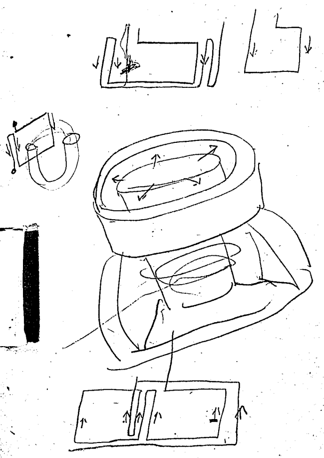
Uranium Yellow a
pigment (Corroel)

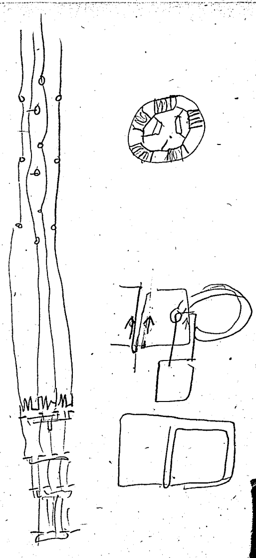


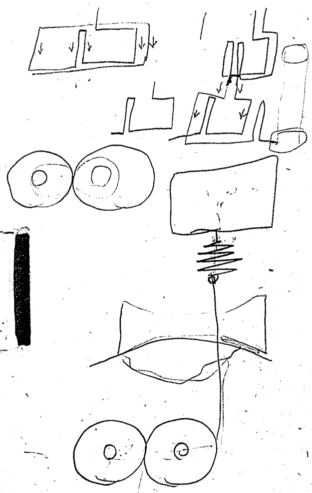


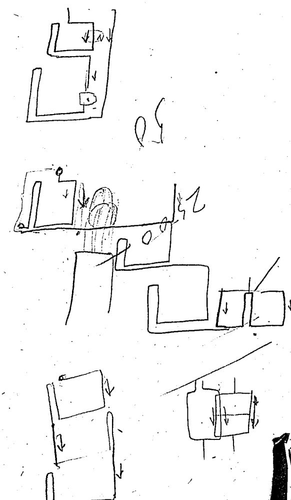


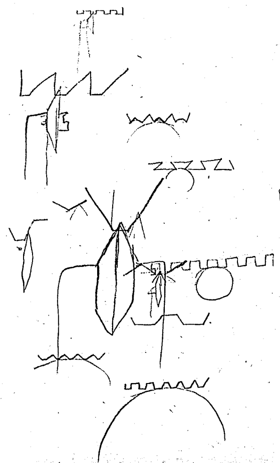


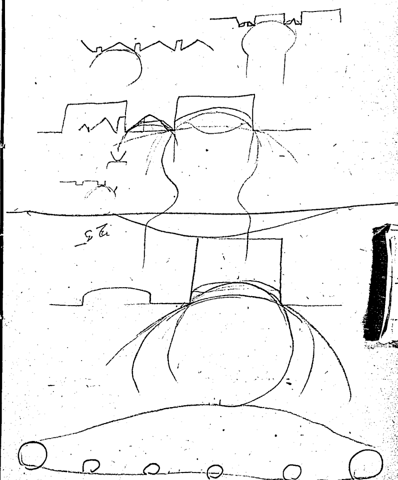


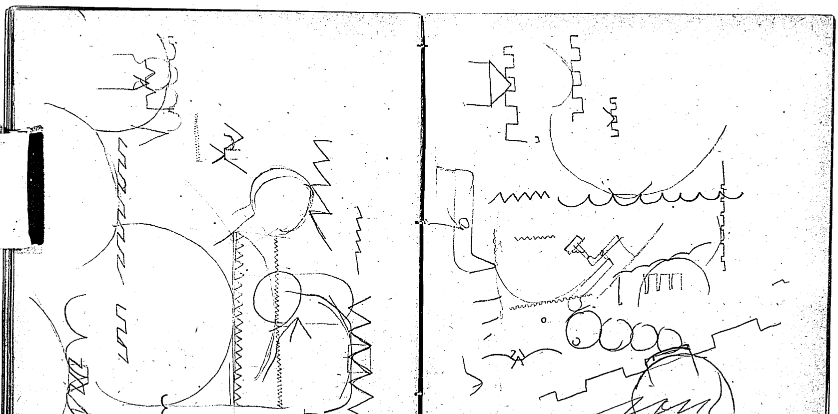












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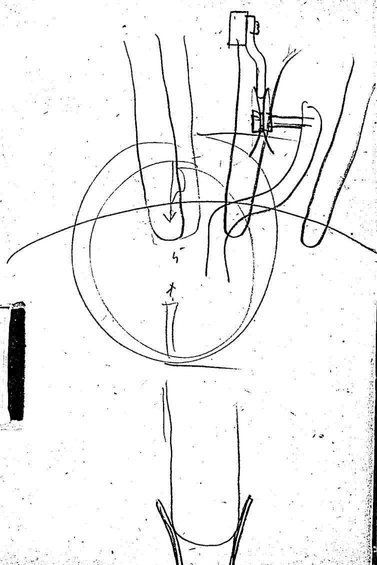
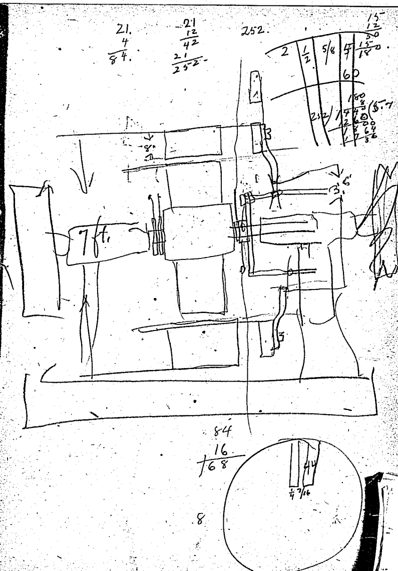

5"
4"


21.
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12
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60
7 ft.
3' 6"
84
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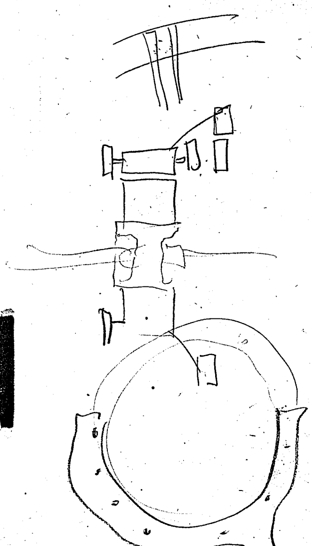
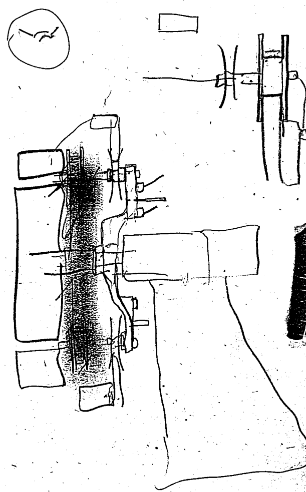
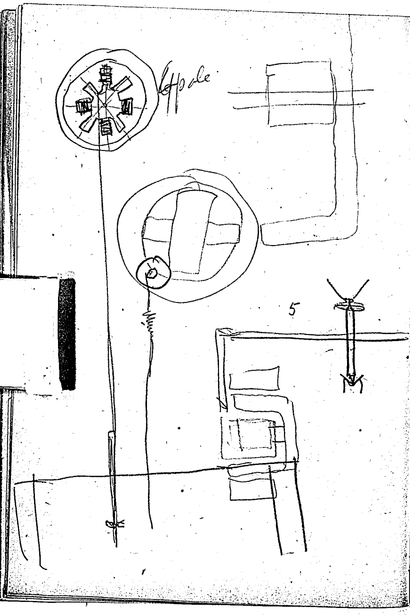
8



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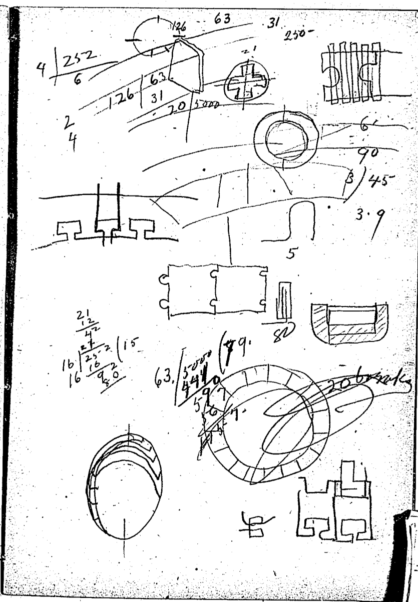
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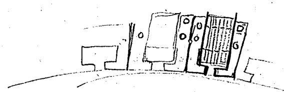
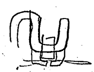
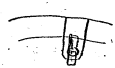
80
21
12
42
16
15
63

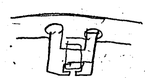
150.—
150.—

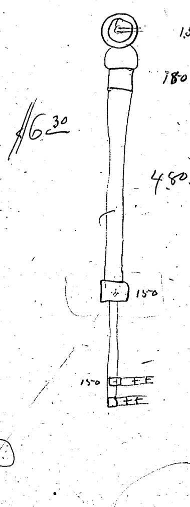
150—
150—

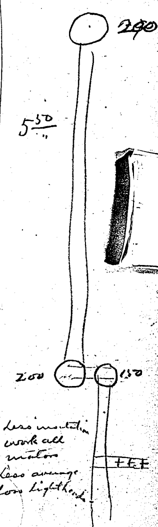










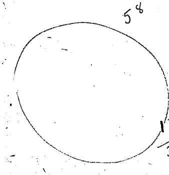


Less insulation
work all
motors
Less average
Less lightheads

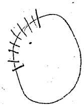
7

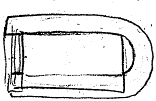
17
300
5100

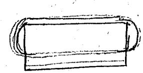
58

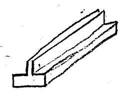


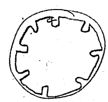
12
300
360

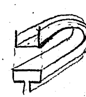


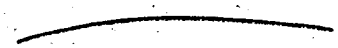


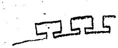






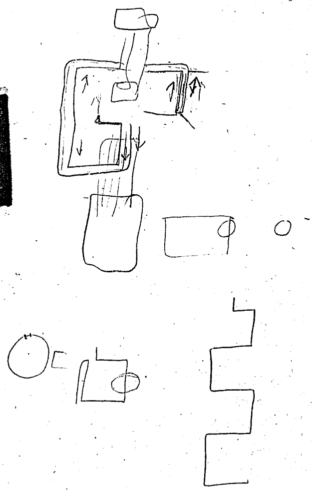


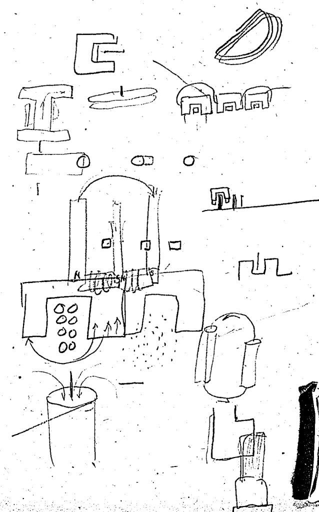




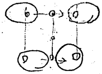
6

17 × 300



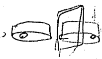


83 — 50

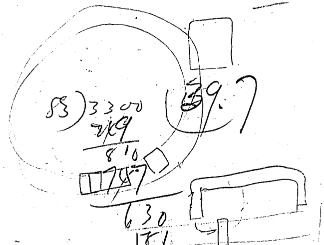


83)50000 (60.2
498
200
166
440

20)83 (41.5
80
30
20
100



83 — 33

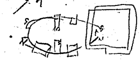


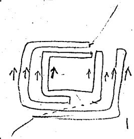
83)3300 (39.7
249
810
747
630
581
490

60)1000 (16.6
600
400
360
400

60)5000 (8

6

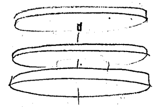




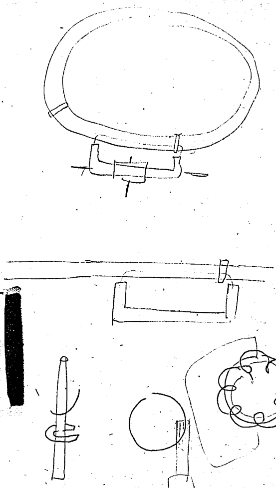
Z o
Z o
Z oc

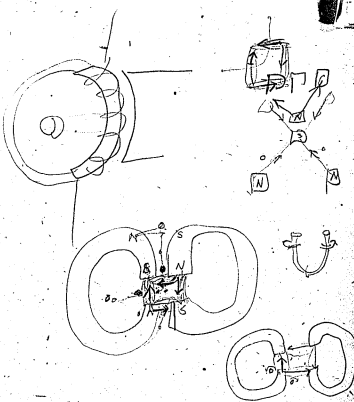
40
3

5 ft

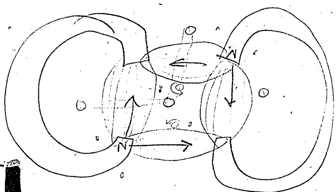


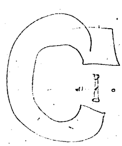
.10 .12 75)1000 (13.
75
250
225

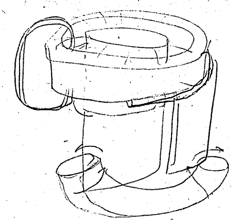


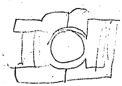


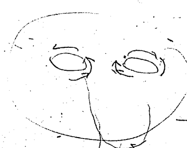
N
N
N
S
N
S
S

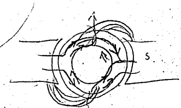

N
N

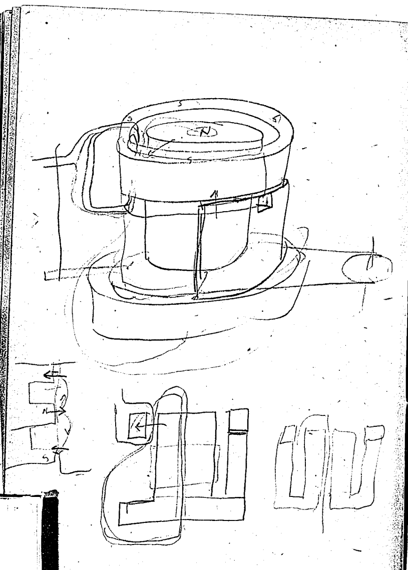




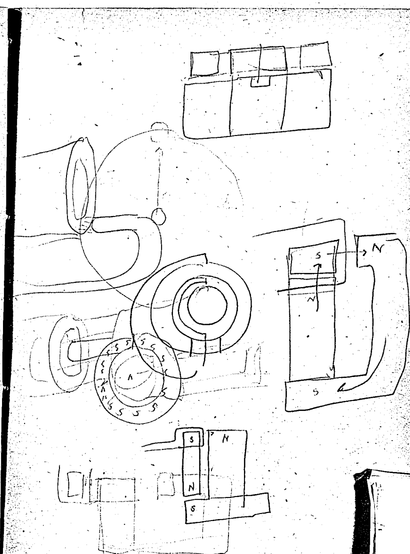




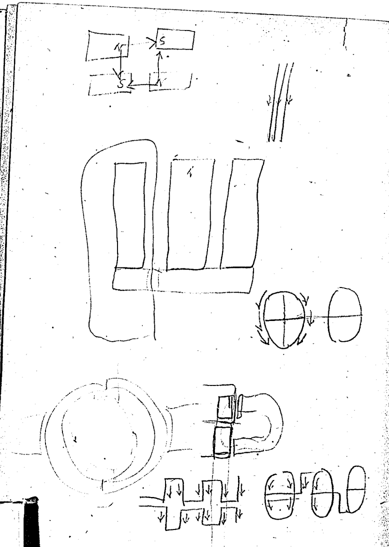

S

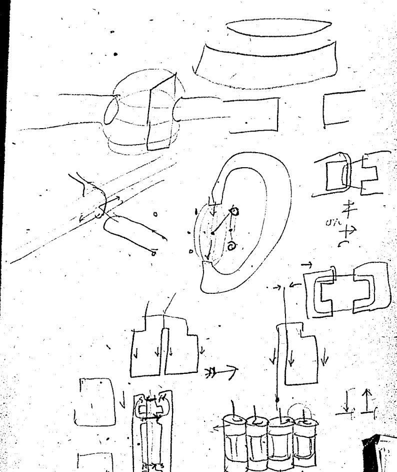


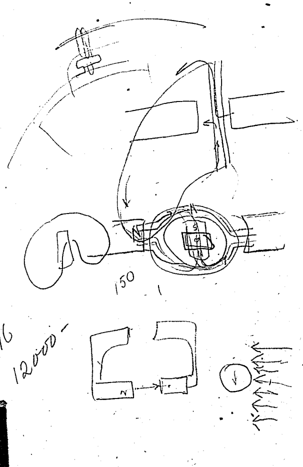
S
N
S
N
S



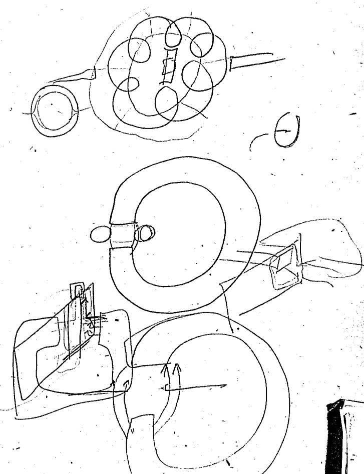
S
N
N
S
S
N
N
S

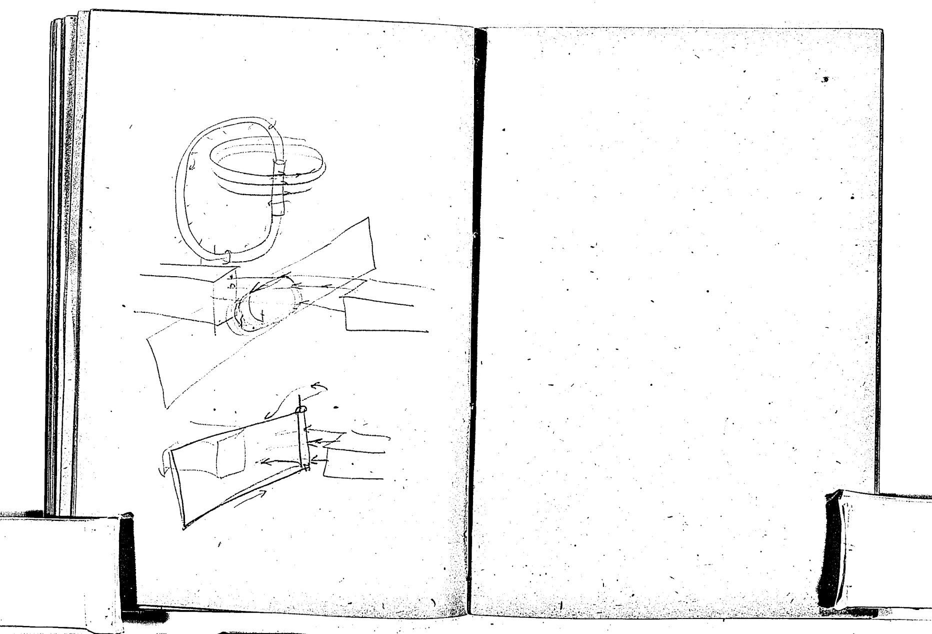

S
S





.16
12000-





202
4
808
40000
3232000

32 320 000

1,800,000 - 1 ft
3,600,000 - 6"
7,200,000 - 3"
14,400,000 - 1.5

5000

322
322
644
644
966
103684
5000
64) 518,470000 (8,100,000
512
64
64

810,000

2240) 9000000 (4

125
125
625
250
125
15625

16
16
96
16
256
2304
1792
2084

90000000
5400000

115
115
575
115
115
13225

22000
44000000
48400000
9680000000
99.1000000

644) 58.81

198
125
990
396
198

12) 247
24
75
72
3240

60 (2062.5 (34.37
180
262
240
225
180
450

202
500000
101000

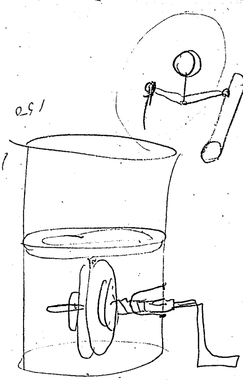
12) 204
24
15
12
30
24
60

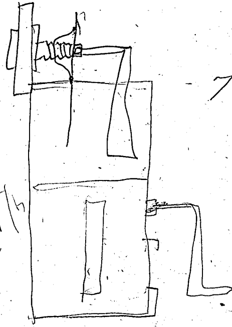
60 (2125 (35.4
180
323
300
250

34.3
343
1029
1372
1029
11764.9

1406

37.5
375
1875
2625
1125
140625





700 -

750 -

15 -

75 -

9

20 material 150
1.5 Labor - 60

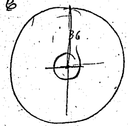
10 -
15
25

10.

25
15
40
4
44

53 -

72
3
216



70
3
210

131
15
655
40 — 131
1965
125
18
1000
125
2305

130
18
1040
130
2340

132
18
1056
132
2476

50000
1600
30 000000
50 000
80000000 (1,242,2305
644) 644
1560
1288
2720
2576
1440
1288
1520
1288
2320

60) 1965 (32.7
180
165
120
450

2,500 000
1000
12000
96000

60) 2187.5 (36.4
180
387
360
275
240
350

216
125
1080
132
46
2100 (2250
12) 270
240
34
66

210
125
1050
420
210
2625.0

327
327
2289
654
981
1069.29

60) 2250 (37.5
180
450
420
300

216
125
1080
132
4
12) 540 (450
48
60
60

12) 2625.0 (2187
24
22
12
105
1980
4
95.0000

25.00
100000000
400000
50000000

50.000
1050
2500000
500000
5.215000000

64
3
192

50,000,000

37.5 36.4

216 — 2250 37.5
210 2187.5 36.4
204 2125 35.4
198 2062.5 34.3
192
186
180
174
168

70
3
210

66
3
198

68
3
204

18
12
36
18
216

60)2400 (40

321.739
2
643478

20000
16
320000

644000

64000

321739
2.5

321.739

1036

644)

1,552,000

2240) 9000 000 (4470

52 million

776397 fill

776397
60
46,583,820

20000
2500
10000000

644)

776397

776397
2
1,552,794

776397
12

336.

2500
50

193200
322
60

200000
9000
180000000

16 ft - 32 ft overhead

1930 ft min

761253

20

24 HP 1 min

33000

12.000

35

3300) 1,200 000
99000
2100000

36

18 HP.

16
200000
33000
297000
23000

9.4

60000000
3000
20000

318 / 544 (1
318
226.

1200

1800

1800

150

7" belt.

5"

50 Red
750 ft speed
15
50
750

36

~~36666~~
~~6733~~
~~65 29933~~

3) 55000
18333

(9.10

2000) 18333
18000
333 30

~~5) 33666~~
~~6733~~

~~(1.119~~

2000) 29933
~~20000~~
~~9933~~
~~6000~~
~~14.93 30~~

50. cost sold 150 –
5 freight – possible
profit $95 – to agent
~~100~~
who personally sells it
$35. from 95 – 35 = 60 – left.

~~Advertising~~

Basis of sales 2000 1st
year. profit 120000 –
general Expense of NA
65000 – leaves 55000
profit. – of this 33 1/3 to

Local Co – 18333 –
leaves 36666 to
NA – 20% Com from the
6733 leaves 29933
net to Namen –
this on 2000 Machines
is $9.10 per machine to
Local Co & 14.90 to Namen –
in case trouble with grapho
any royalty we may be
compelled to pay be derived
from these sums in proportion
~~Supplies~~ – Rentals
to be abandoned as soon
as possible ~~after~~
Rental Contracts are Ended
but in meantime –

N Amer is to attend to the same where practicable & after deducting Costs of maintenance &c. to divide the profits ~~of~~ from rentals 33% to Local 66 to NA—

Nickel in Slot, same way—

Supplies—

Local agents to get 20% profit on Supplies for attending to business of the profit left 40% is to be deducted

5/16
3

as general Expense for Conducting NA Co & ~~20%~~ ~~Com to genl agt &~~ ~~Bal due bal~~ & bal net profit divided 33 to Local 66 to NA

for instance, Cost of a Cylinder 10 cents. freight 1c Total 11c Sold at 25 cents to Consumer 20% of this to Local agent is ~~30~~ 5c leaving 20c deducting 11 ~~12.8~~ 11 cost leaves 9

9 profit deducting 40% gene Exp for N Amer or 1.8c ~~3.6~~ leaves ~~5.4~~ 7.2 divided 33 to Local 66 NA

or 2.4 to Local 4.8 to N Amer.
other Supplies figured same way

Thus the proportions are
33% to Local 66 to NA
but from the 66% 20%
Com is paid or net 53% to
N Amer —

66
13
53

All musical Records
~~Except~~ to be sold at
uniform price ~~East of~~
~~Denver to~~ the public

~~400 ...~~
from say
for 50 cents. ~~plus freight~~
~~Cost~~ Cost now 33 but can
be got to 30 c ~~Cost~~ freight
~~leaving freight 3 cents~~
~~Leaves~~. Leaves 20 ~~%~~
cents profit. this to be
divided just as profit
on blanks are divided

Same area White mountain or Quint mine

Alden Miner pasture Lot mine

near house Mr Little, (E Parker) Cupronickel
do near W Littleton PO -
Albee mine - (Extension Gardner Mt Vein)
Little mine -
another mine 125 ft E of Albee mine
Way + Mason openings further north
Dodge mine
Dodge + Lisbon Mining Cos
Dow mine in the Conglomerate
Gordon mine "
Bedell gold mine
Atwood gold mine

3)72
2.4

5)90
1.8
7.2

90
36
5.4

3)5.4
1.8

160
32
12.8

Wurz Amer Jour Sci 1858
& Sillimans Jnl 1859 says in
Lincoln & Gaston Co NC
Ni & Cu ores especially abundant
on western Slope Cross Mountain
Covered with gossan

Nickel Mine at Brass Castle
Warren Co NJ named Witty
mine Oper C F Staats,

Nickel Mine, Dracut Mass
operated in 1880 produced 13000 lbs
Location Dracut Middlesex Co
Mass

Ore Knob Ka mine 1% Ni in ore
gangue pyrrotite Quartz & Calcopyrite

Ammonoosuc Gold field -
Geo of NH p 272 = Bounded on W
by Conn River N by Town of Dalton
E & S by gneissic area or fm W
border to Bethlehem thru E parts
of Lisbon & Landaff

This embraces whole of Towns
of Littleton, Monroe, Lyman, Bath, &
part of Haverhill Landaff & Lisbon
Clay slate occup 2 lines separated by
Lyman group the more eastern one is
auriferous.

Atwood gold mine 1 m E of Lisbon
Village — NH =
auriferous conglomerate as in the belt.
The clay slate East of Village Lisbon
1500 ft thick Carbon quartz veins
Dodge Mine yields 15 @ 25 per ton
all suggests he say same horizon as
Gardner Mountain Cu & Pb is
generally disseminated in shists near
Lisbon Village Cu mine opened fullum
at Bald Ledge Cu shists have been
opened in 2 places
in same field - NH gold mine - also in quartz
over 1000 ft long - Later
New England Reduction Co, in Conglomerate

pyrites deposits Louisa Co Va Vol 12 Mining Engrs
p 527. — Map —
article says — deposits found Va near Lynchburg — Md Cecil Co
Anthonys Nose NY — this is pyrotite, near North Adams Mass.
Milan ^containing^ NH, Blue Hill Me Vershire & Corinth Co VT,
Capelton & Balton Canada.
Ducktown Tenn Carroll Co Va Rowe mines Mass
Brockville Canada — gold & silver & Cu invariably
accompany these pyrites — quartz veins invariably
near these deposits contain gold

Louisa Co mines — 60 miles from ~~tidewater~~ at Richmond
130 m from Newport news

Ore Knob Mine NC.

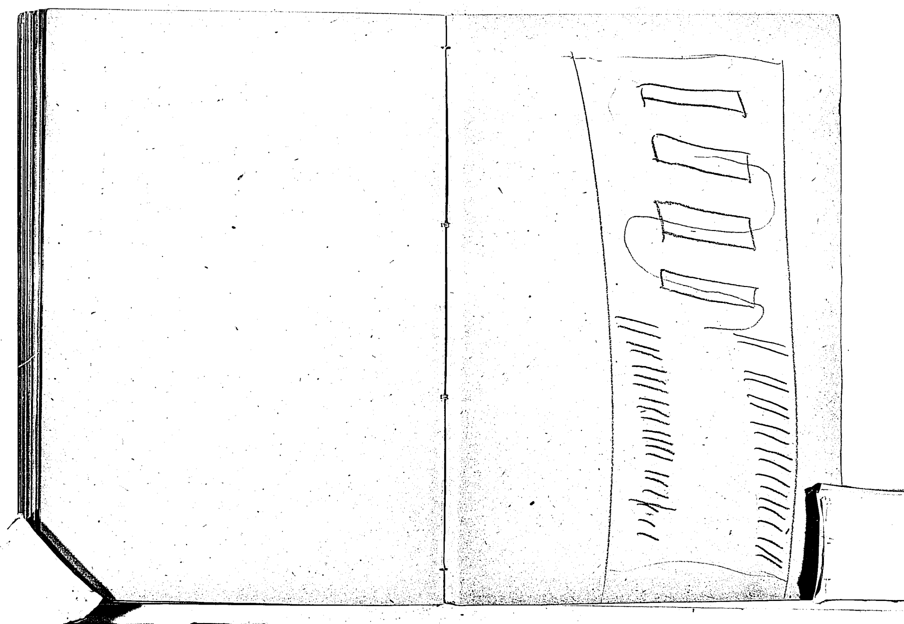
Tallapoosa Cu Mine Ga Stone Hill Sulphur

mine Ala —

Charlemont Mass — & Louisa Co dont carry
much Cu —

Liberty Mines Md — Copper bearing Slates
~~[illegible]~~ of Sandstone of Pa & NJ —

Clay & Coosa Co US Geo Survey 1882
immense quant pyrotite containing 10% Cu.
not very accessible —
Iron ors at Antwerp NY contains Ni



Revision every year in this proportion —

Books open to accrediting officers Each Co —

18
20
360
4
1440
12
17280

8

50
33
83

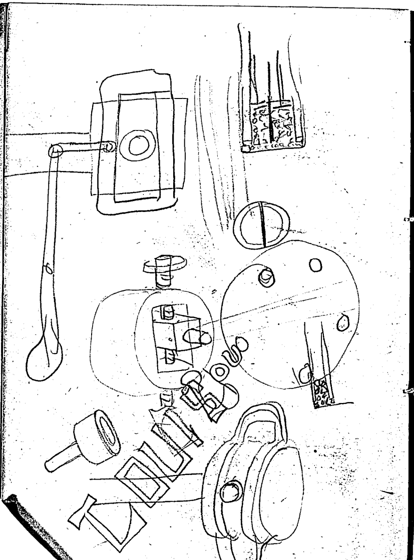
We do all the buying

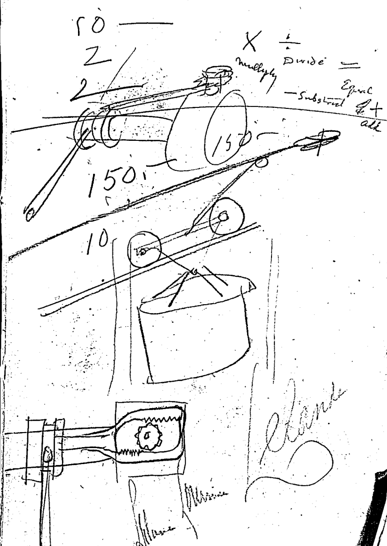
We sell phono 150 plus frt — We pay Comm 30 to sell & 20% on supplies We pay 20% Com to Genl Agt on net profit to N Amer, bal profit ~~20 65~~ goes 50/83 to NA

33/83rd to Local —

Cost phono 50 — Cylinders 10 —

music 30 —





50
2
2
150
150
10
X
÷
multiply
Divide
=
Equal
- Substract
+
add

Notebook, N-90-01-04.5

This notebook covers the period January 1890-April 1893. All entries are by Edison. The book contains notes, drawings, and calculations relating to ore milling, including what appears to be a list for a patent caveat. There are also electric railway drawings and notes for a series of chemical experiments. The front cover is labeled "#583"; the number has been crossed out. The inside front cover is inscribed "#583 T A Edison Jan 4. 90." The book contains 182 numbered pages and has been used in both directions. Two pages were removed before the book was paginated.

Filming order: 1-147, 182-152.

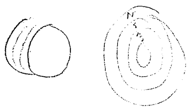
Blank pages not filmed: 2-3, 48-139, 148-151.

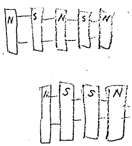
N-90-01-04.5

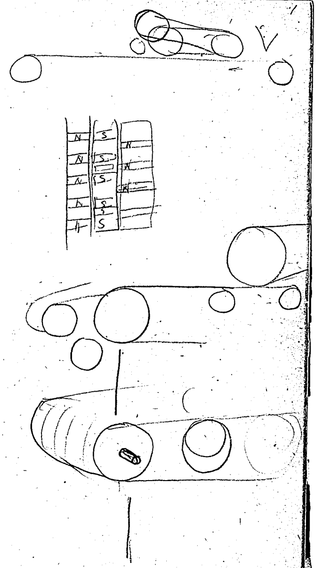
#583

TA Edison
Jan 4. 90

x E-5286







	Sp grav	Hardness	Streak	Fracture	Phenom	Color
Pyrite – FeS_2	4.83 @ 5.2	6 @ 6.5	greenish or Brownish Black	Conchoidal uneven Brittle –	Strikes fire with steel	Pale brass yellow
S 53.3 Fe 46.7						
Cubanite S 39 Cu 20 Fe 38	Sg – 4.02	H 4	Dark Reddish Bronze black.			Bronze & brass yellow
Calcopyrite 35 S. 34 Cu 30 Fe	4.1 @ 4.3	3.5 @ 4	greenish black	Conchoidal uneven	Subject to tarnish often iridescent Can cut it with a knife	Brass yellow

Pyrite: Ni Co Cu Thallium sometimes replace ~~iron~~ a little of iron –
Closed tube S sublimes Residue Magnetic
Ins HCl Dec Nitric –

Cubanite: Closed tube sublimate.

Calcopyrite: Thallium & selenium Sometimes present.
Closed tube decrepitates – Sub of S
dis in Nitric Except S green solution
NH in Excess changes to deep blue

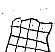
Stannite

H. 4 — G 4.3 @ 4.5 Lustre metallic
Streak blackish. Color steel gray to
iron black – the former when pure, sometimes
bluish – after yellowish from Calcopyrite.
Opaque – Fracture uneven Brittle,
S 30 Sn 26 Cu 30 Fe 12 @ 6.
Zn 7 @ 8. Closed tube decrepitates.
faint sublimate. open sub of Sn Oxide,
Dec nitric blue sol separates S + Oxide Tin

Linnaeite –
H 5.5 G 4.8 @ 5 Lustre metallic

1600 mesh

5



8

4

20 tons

5

50 tons hour

1000 lbs –
20
2000

10 +

27
4

100.

10800 –

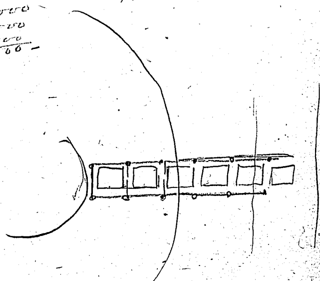
1 pair rolls 50 tons hour

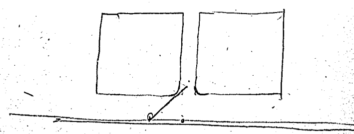
50 screens — } net 10 ton 1000 m in 20 hours

10 pair rolls — 500 screens.

25 000 —
10 000 —
5 000
12 000
3 000
10 000
65 000 —

1500 —





Pyrite, Grav 4.83 @ 5.2 –

S 53.3 Fe 46.7 . 67 weight –

Calcopy – G 4.1 @ 4.3

Cu 34. S 35.8 Fe 30 – 82
42 –

Mispickel. G 6. 6.4

As 42.88 S 21. Fe 36. 50

Pyrolite. G 4.4 @ 4.6%.

S .38 Fe 57. Ni 3

S 40.15 } 84.
Fe 59.18 }

670
66
4020
4020
4420
71
30) 70 (2.33
60
100
90
100

47
20
67.

428 lbs to 10 lbs

470
66
2820
2820
16) 3102 (194
16
150
144
62 1/2

7) 30 (4.28
28
20
14
60

6 oz to lb

oz to lb
160

1.2

6) 160

70
6
16) 420 (26
32
100

64.

700
65
3500
4200
16) 45500 (28
32
135
128

596
6
3576
3576
16) 3894 (24.3
32
69
64
54

60
24
44

400
66
2400
2400
16) 26400 (16

36
14
50

360
66
2160
2160
16) 2376 (148
16
77
64
136

11

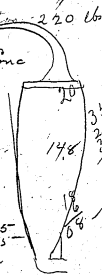
10 m. 1.

783

mining 25
Crushing to 40 mesh - 25
Concentrating 10
60-

Must have $1 to pay
crude ton - 220 lbs pyrite

or $6 per ton Conc



350
290
330 c
4

Conc -
Drying 3
Semiroasting 10
Magnets - 10
Dead Roasting - 75
Re Concg 9 - 50
148.
Bricking Iron 35
Making Copper 125
148
308

Total 908.-

Get 75% of ore - at $3. 908
225
6.83
Total 1.00
Genl Ex
Total 7.83

E1

60000

908.
600
3.08.

18000,
18000
36,000-

2-

5000-
24
20000
10000
120000.

62
300
/8600

250

25
9
225-

33
22
66
66
9/726.
185-

2240) 275000 (123
2240
5100
4480
6200-

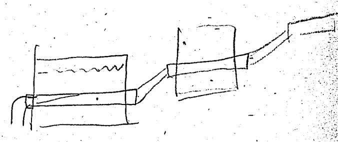
3 /225-
75-
5
375

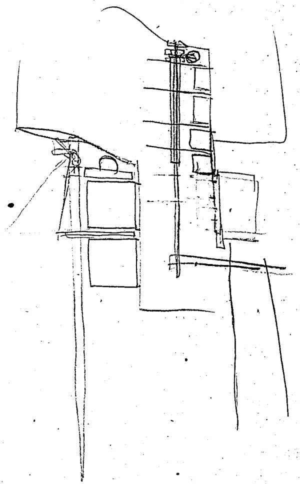
375- Cu
225- Fe
60,0-
2

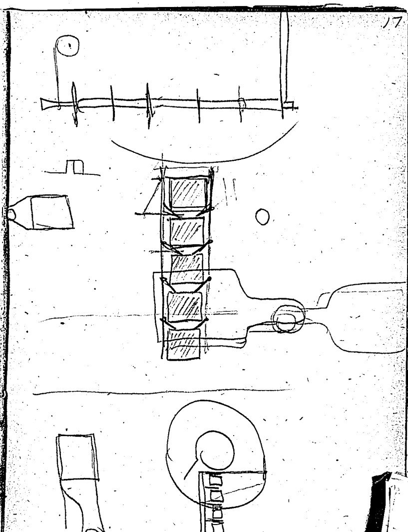
10. 30

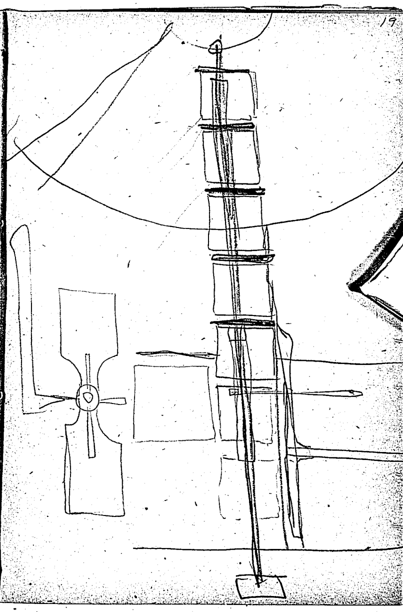
60
300
/8000.

175
30
52,50





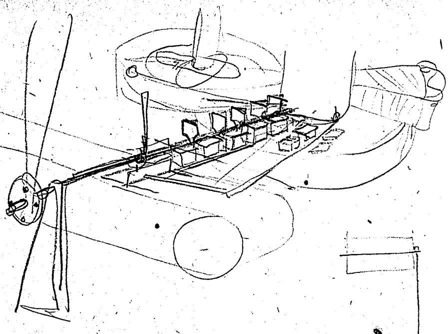


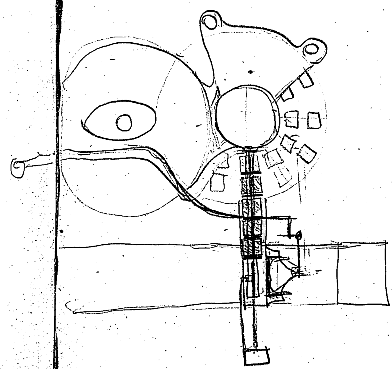


36—

49
78
392
343
3822

36
78
288
252
2808





Note - Vol. 1 to V.
on pgs 25-47 refers to
Watts, Dictionary of Chemistry
1883 Edition
N.R.S.
10/5/53

Miscellaneous —

By action of ammonia + sulphur on acetone a number of products are obtained of indefinite character —

~~Acont~~ aconitic acid — aconitate Calcium gelatinous when nearly dry then Resin. —

Albumen Combines with Lime, product dries after while hard as stone also combines with Na K Baryta &c

Chloride Cal combines with alcohol to white amorph mass see Vol 1 - 80 -

Sulphide of Allyl forms with aqueous Trichl of gold beautiful yellow pp - cakes to Resinous mass & becomes covered with films gold. Vol 1 · 144 —

Sulphide Platinum - pp - when dried at 100 C takes fire & glows until reduced to Pt — Lamp —

~~When~~
Antimonides of Methyl -
Hydrate = Storage bat - Vol 1 345 -

Arsenic alloys w. Cu white Malleable
pbly no focaults,

Arsenite of Sb. Transparent fused
vitreous mass

do - Arsenate Aluminum
Stannous Arsenate, gelatinous

Sulpharsenite Tin - gummy
Sulpharsenate Silver grey ductile Cake
Exhibiting Metallic lustre,

Cyanide of Cacodyl - for War -
Bromide gold & also Pt dec by slight
heat = (Heat photography) -

Chrysammate KO Crystals
peculiar effect of light,

Cinchonedine Electric by
friction.

Sulphate Cinchonine become
phosphorescent at 100 C.

Sulphate of Iodocinchonine
Crystals act like tourmaline to light

~~Cocoa~~ Coca wax strongly
Electrical by fctn

End Vol 1

Cobalticyanide of Hydrogen heated to 250C leaves blue powder & higher temp Carbide of Cobalt, black is it a Cond[uctor]

Carbide gold 214 2nd—
" Iron— 222.

Platinocyanide strontium — white but so sensitive to moisture that breath turns crystals blue —

Sulphydrate Calcium takes hair off

Formate Hg decomposes in dark also by pressure on crystals or 100C heat

Formate Silver even turns
black in the dark See Kennelly

Fulminate Silver
gradually blackens when
Exposed to white or blue Light,

Chem compound of gelatin
& phos Calcium is attainable

Glucinium dont combine
with sulphur at any
temp - forms alloy
with Silicon -

glycerides in Chloroform
& alcohol -

Guiacum Violet rays spec turn green - Red ray

restores the yellow color

End 2nd Vol

Protochloride of Iodine - Chlorine removes an H & Iodine goes in- to Iodine places -

Barium Salt of Isethionic acid swells up over 100 times its bulk - KO salt melts 350 & Solidifies to a material like porcelain - without loss weight

Copper amalgam expands on setting
is highly plastic like clay

Iron amalgam - magnet (10) Hg
globules magnetic - Ampere ...

Mercuric oxide the weakest of all
basic oxides being only salt
pp from its salts by water alone

Boric Methide, takes fire
spont in air bright green flame
~~[illegible]~~ of escape through tube
in air amount of smoke
surprisingly great. 2 or 3 Cubic
inches of gas burnt this way
fills large room full carbon
flocks flame moist & hand
can be held in it. Vol 3 986

Methylamine is the most sol in water of all known gases

Molybdenum harder than Topaz —

Phosphide of Molybdenum Conducts Electricity diffuses

Volatile Oil. when cold dissolve Oxide Copper & deposit the ox on heating = Ore

Olivil - Resin Electric

Oxalate Calcium dry highly Electric

Potassio-Manganic Oxalate
purple liquid very easily
decomp Light & heat

do ammonio-mercuric oxalate
do Potassio-mercuric "

See - 432 - IV Resin very Electric

Hydrochlorate of Chloraniline
the Chloroplatinate of a-chloraniline
gives violet film on Exp. to Light

Ethylaniline turns brown
on Exp to Light or air
amylaniline odor of
Roses

Sec B-8510
Watts Dictionary of Chemistry

See - ~~Phenyl B.~~ Benzhydrolic
Ethylate - 479 - IV
+ acetate " "

Phosphite Chromium dry salt on heating gives off pure Hydrogen

Hemisulphide of phos dis in oil, Shines in dark - 599 - IV

Pyperine - See 659 IV Electric

Tripotassamide - for red + smelling
Else for white Lolling in air
in Vac by Crack - Vol IV 695

Pot + Phos under Naptha
unit only boiling Naptha

45

Tartrate or Citrate Lead ignited ~~in H ... ~~ make a pyrophoric stuff - might seal in Vac + then slowly permit O in =

Sulphides KO Na Lithium ~~Obtd~~ obtained by igniting corresponding sulphates with Lampblack —

Alum or Hombergs Pyrophorous by heating alum with Lamp black, starch, or flour, Exhibit spontaneous inflam

IV 765-6 —

Hydroferrocyanite Quinine Resembles Mosaic gold

20 Val V

Iodoquinine Effect of light fumy Vol V 25

Pyrotartriamide with oxide Lead dissolves paper + Can't be filtered

guncotton when ignited in small quantity in rarified atmos Exhibits 3 dif luminous phenomena in high Vac beautiful green glow as vac gets lower, yellow, etc good = see pyroxylin IV 780

3rd Sup pt 2nd Oils volatile

See oxidation p 1430 —

April 10/93

JAL

1 The use of Of an odd number of rolls —

~~Applying~~ pressure to the Crushing
2 Rolls by a multiplying rope gearing with 2 or more rolls sub as described -

3rd arranging one roll above the other.

4th first passing the ore through one Roll then the other.

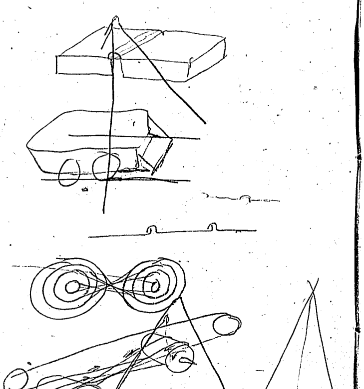
5 Improvement in art of crushing Crushing in producing great pressure between ~~the~~ Revolving Crushing rolls by the multiplying action of moving ropes or Equivalent device arranged sub as described so ~~that such pressure~~, without ~~[illegible]~~ Transmitting such pressure through fixed bearing surfaces -

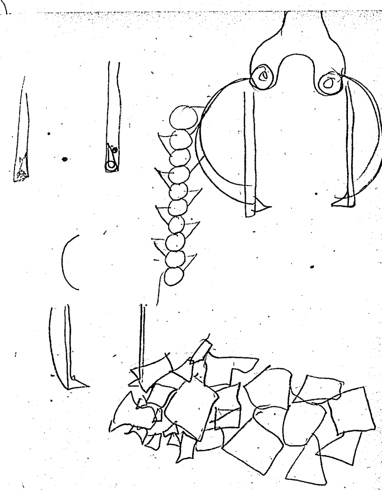
The use of a spring or Equivalent weight producing a constant but relatively small tension on a travelling rope. & multiplying such tension many times to produce great pressure between rotating Crushing rolls sub as set forth,

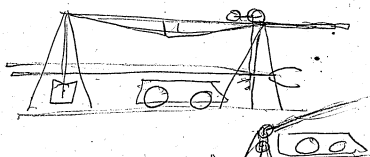
The fixed sheave ~~[illegible]~~ & moveable sheave take up,

Two rolls alone could be used the ropes on the sheave crossing at Each turn, but this Method of application is not so effective as with the 3 rolls -

~~Again~~







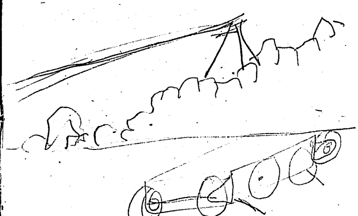
50 | 6000 (120
500
1,000
1,000

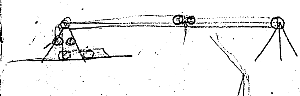
120 cars

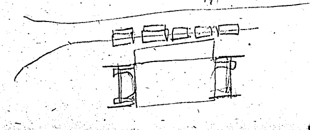
14 cars

1200 | 6000 (5 min
20
7
40 =

10







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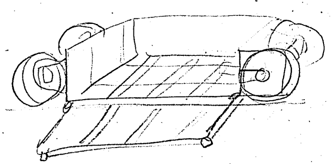


[THIS BOOK WAS USED IN BOTH DIRECTIONS.
THE FOLLOWING PAGES WERE FILMED FROM
THE BACK END FORWARD.]

300

14820
9490
5330

2280
9490
4120

280
350
14000
840
98000

290
350
14500
870
101500

280
350
14000
840
98000

280
350
14000
840
98000

285 650
10

2280
650
114000
1368
148200

8, mills, 800 000
opening mines. 80 000
RR - etc. 200 000
1,080 000,

8, Mills.

8000 tons daily ore. 3200.
1200.
570.
570
250
570
6360

285
8
2280, tons daily.
4 | 2280
570

freight. 18,000.

2280. 40
8
320000

6360
3130
947

12
2280 Crushing etc. Roya.
570 15
280 8000
3130 120000

1000
333.

333) 1090. (3.31

285
45
1425
114
1282

285
9.90
2565

285

27
180
2160
27
2760

333
8
2664

331
50
381.

3.

3.81

500.
120
128
136
256
480
285) 1090. (3.85
855
2350
2280
350

610
381
269

385
50
435.

2664
300
799,200

2,400000) 66,660,000 (27
48 000 000
18 660 000
16 800 000

269.

2664
269
23976
15984
5328
715616
300
214,6800

6666
10,000
800) 66,660,000

10 -

8000
300
2,400000

400.
200
12) 80000 (6666
72
80
72
80
72
80

6666
12
13332
6666
79,992

27
3

12 feet.

40

350
8
2800.

60

75
300
£3,500

500)1090(

450
400

5

2.00
2.25
4.25

333)1090(3.

3.90

450.

400)1090(2.50
800
1900
150
400.

1000 60c

3c per 100 lbs - Mining & Mil'g -

15 pc ore 12 net. ~~200~~

Expenses $600.

10 pct ore 125 tons. at 500 - 550 & loss 100 -
10 pct ore	125 tons	at 500	825	profit	225 X
15	150	500	1000.	"	400 X
20	200				
25	250				

500 ~~20~~c 625 - profit 25

10 pct ore		125	335
15	2.50	187	650
20	33.5	250	960
25	96	312	1270
30	1.27	374	1580
35		436	1890
40		498	

Carnation Evrington,

125 / 2500 (2

125 / 625 / 1000 (8. 3 / 1000

1000 / 2500 (2.5

2496 600 781

250 62 312 400 1560 631

436 62 249

72. 720 / 22000 (30

30c 125 625

28 312 62 374 1870 1270

825 600 225

22 33 66 726 935

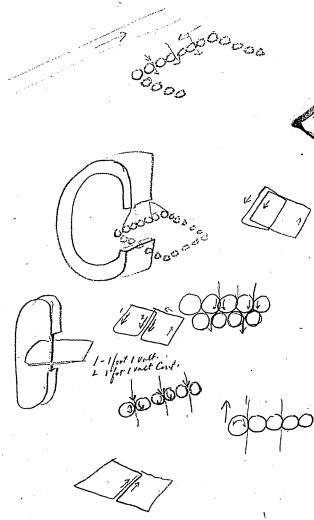
374 62 436 1780

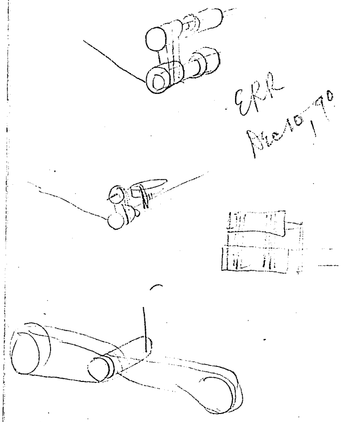
10 pictore   2,5 C Raw Ton

9600

1.27   1) 6500   6

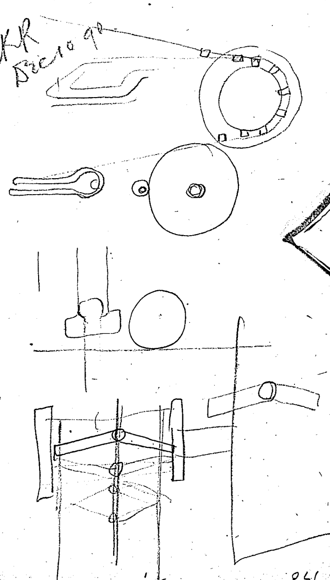
1000) 3350 (3,35
3000
3500
3000
500


1 - 1 for 1 Volt.
2 1 for 1 vact Cont.



ERR
Dec 10 90

EKR
Dec 10 90



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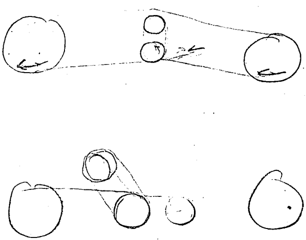

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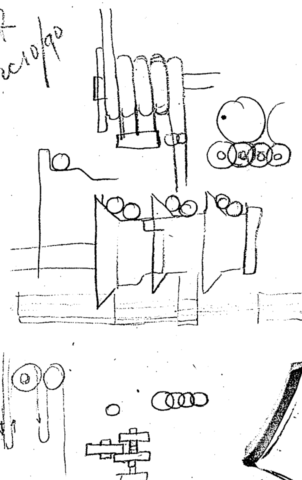
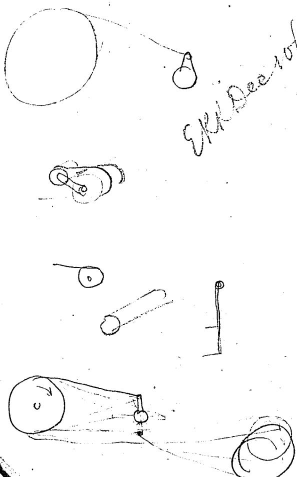
Dec 10/90



EKK Dec 10/90



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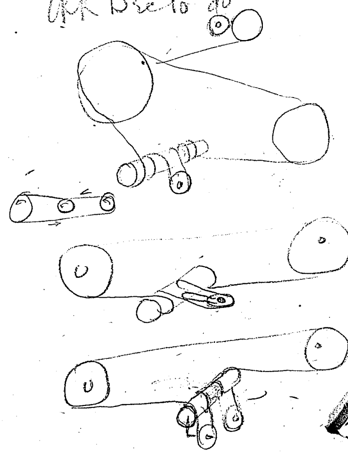

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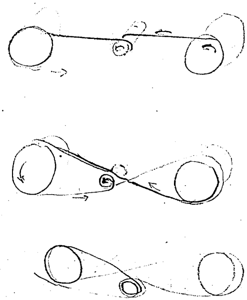
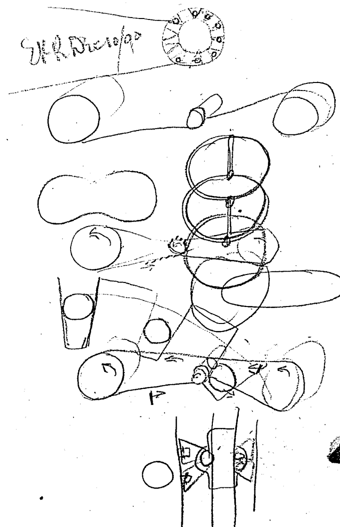


EKK Dec 10/90



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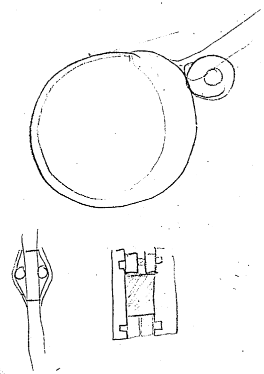
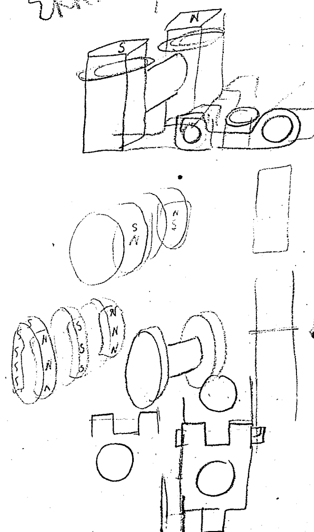
ERK Dec 10 90

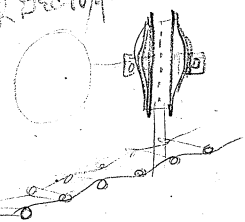


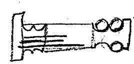
ERK Dec 10/90



60) 1696. (28
120
496

SKR Dec 10/90

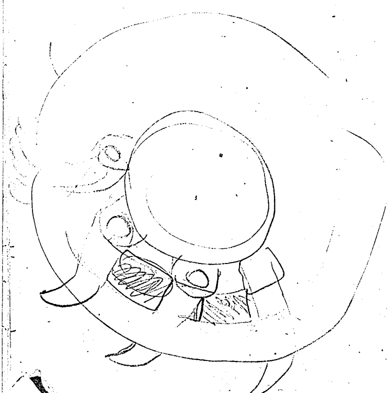


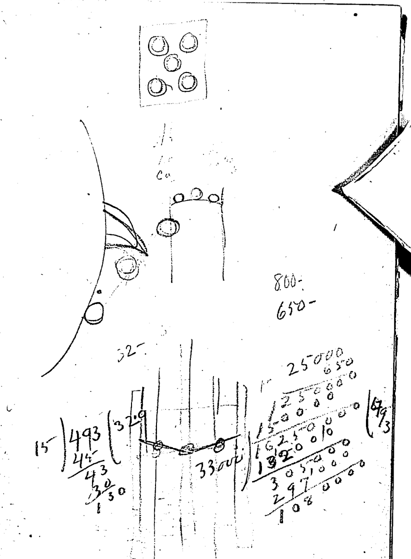


28000 ft in hour

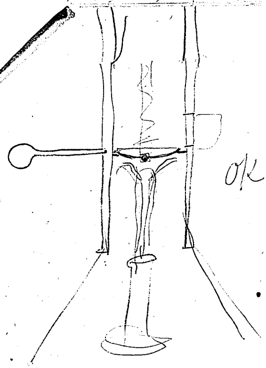
12

28000
2000
33000) 56000,000 (1696.
33000
23000 0
19800 0
3200000
2970000
230000

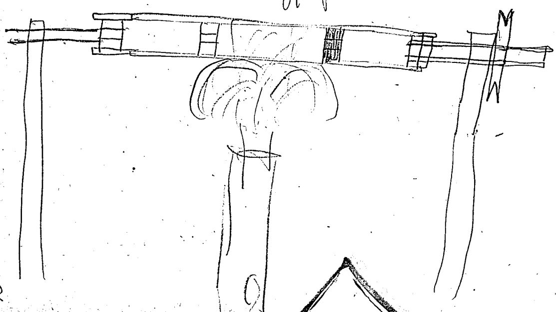




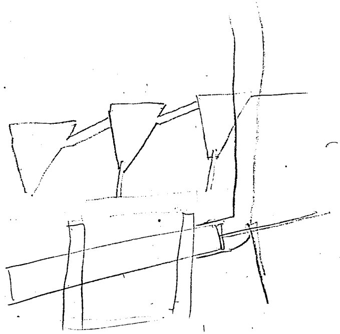
800-
650-
15
493
45
43
30
130
25000
650
33000



ok

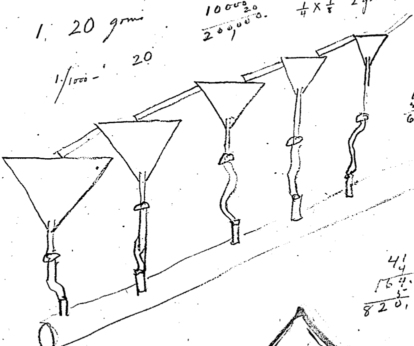


ok for distilling



1. 20 grms $\frac{10000\ 20}{200000}$ $\frac{1}{4} \times \frac{1}{8}$ 2 grms or 5 grms gold

1/1000 - 20



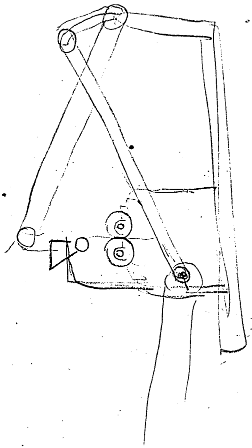
250
250
12500
500
62500

4/1000 - 5000

120) 5000 (41.
480
200
120

41
4
164. mg
5
820.

75°



Notebook, N-90-01-04.6

This notebook was begun in January 1890. All entries are by Edison. The book contains notes, drawings, and calculations relating to ore milling, including cost estimates based upon labor and energy requirements for separating iron, copper, and nickel ores from the Sudbury mining region. There are also notes regarding the testing of numerous chemical compounds for potential use in incandescent lamp filaments or phonograph cylinders. Edison's notations indicate that he assigned many of these chemical tests to an experimenter named "Joe," possibly John Joseph Force. The front cover is labeled "584." The inside front cover is inscribed "584 T. A. Edison Jan 4. 90." The pages are unnumbered, and at least one page has been removed from the back of the book. Approximately 130 pages have been used.

90-01-04.6

#584

TA Edison
Jan 4.90

40
64 oz
10-
44
40
176
32
44
50
2200
.5 volt.
1.22
32 amp - 1
1/400 of ohm
44-
32
44
128
128
1408
40) 1296 (32.
120
96
80
16
400 - 1
750 ft lbs
11 ft lbs
400
4400
1½ hp
32.
1. 44
2 176
4 . 704
8 2816
16 11264
32. 45056

8 ohms - 3 sq inches -

3 ohms per sq inch = .55 volt,

144
9
1296 -
1	3
2	1.500
4	.750
8	.375
16	.188
32	.094
64	.047
128	.0235
256	.01175
512	.00562
1024	.00281 ohm

15
½ oz - 1½ hp
per hour
1 lb per 1½ hp

32 amp - 37
11 ft lbs ½ amp
1
2
4
8
16
.5 ohm
44
176
704
2816
11224
44896
.5 on
25/100
12/100
6/100
3/100
1½/100
1/200
1/400
32
128
256
512
1½ hp -

300

24/0 oz per hour

1 amp

240

12 lbs

400 amps

1 volt 1 ohm

44
400
17600

24 lbs per day per

100 hp per ton.

1200 hp

25
6000
150000

2

400) 10000 - (25
8000
2000

75000
27000
10000
8000
120000

25 — 6
12 — 3
9

72

120 tons 32

400. amp

800 lights.

64) 1200 (18
640
560
512

30 7
5
1 5/8
35

12

3000 hp Trip Expn -

$25 per hp -	75 000
$9 per hp boiler	27 000
Bldg -	15 000
pump piping etc	10 000 -
Dynamos -	54 000
Belt shafting	10 000
Wiring -	12 000
Vats -	25 000
Cranes	5 000
Cost Matl - -	2 000
Roasters & Extra -	15 000
Water piping etc	5 000
	255 000 -
Vat House	20 000
	275 000
	~~190 000~~ 2
	450 000

1 million gallons

24) 1.309 000 (amp 54160
120
109
96
2000 480 2000 40000
24
160
144
160
2000 per year 6

24
200
4800

16
300
4800

320 | 2000
1920
080

100.

320
20
6400

30 ton daily

#6 per ton for power

54000
12
108000
54000
648000

#11 per ton

24
6
144
3000
432000
161000
271000

2.

20 per hp per yr

75000
27000
15000
10000
5000
132.000

/17

30

Coal – 3# lbs slack, 50c 4 tons hour

#2. per hour	48. 300 19000	16000
		7500
12 firemen		5000
4 Engineers		2400
4 oilers		2000
oil		7000
Repairs		1000
grate bars		1500
Insurance		2000
Taxes		4000
Chief Engr		5000
Extras		

3000) 53,400 (17
3000
23400
21000
2400

3. 53400
16000
69400 (23
6000
9400
3000

40) 650 000 (amp
16,250

40
250
240
100
80
200
200

25 volts

16250 -

5

30.

24
200
4.80

4 tms Malta

3 15

40 10

100.00
200

Coal 32000
Chief Engr - 3000
2 Engr - 2500 -
2 oilers - 1500 -
oil 1200
10 firemen 6000
10000

3000) 56200 (18.75
30000
26200
24000
2200

~~40~~ 60 -

75
2000
1500

127000 .

25
280
25
1400
560
7000
2257 ..

28(

16000
4
64

3000) 32000 (1

355
50
175

140 —
35 per Con

190
120
4

3500
300
105
13

50

1.2

280
8
224
896

50000
70000
120000
86150
33
24

280
25
1400
560
700

70.
37.50

75
500
375

14
2000
2800

4900
3750
8650

280
175
1400
1960
190
280
49000

280
30
8400
5000
134000
138650
471

4750
4
19000

288

365
288
2920
292
730
105,120

2240 | 12000 (5.3
11200
800

15.000
1.25
75
12,00

1500 | 12000 (8.
12000

3

12
24
48
24
288

32
365
32
730
995
1068

6000 hp - 24 hours 365 days -

Coal 2 lbs	at 2.25.	105,000
Chief Engr. -		4,000.
4 Engineers =		6,000.
2 oilers -		1,500.
2 Laborers -		1,200
16 firemen -		10,650
6 Laborers =		3,500 -
2 firemen foremen -		4,000
Grate bars.		2,500.
Oil.		2,500
Repairs =		5,000
240 000 Interest. 6 pct.		14,500
Depre -		9,500
Insurance		1,800
Taxes -		3,000
		174,650

5 4

365) 174000 (487
1460
2800
2555
2450

50 tons
200 - 150 hp for Cop

40) 477 (11.9
40
77
40
370

150
40
6000

) 6000 (40
6000

40 -

365 - tons

365 (2340 (6.49
2190
1600

75
230
2350

174000 total Cost 6000 hp -

6000) 174000 (29 per hp -
12000
54000
54000

Steam only

Daily		
Helpers for 200 tons Matte	10 men -	20
Melters -	10	20
Copper strippers	5	10
Roasters,	5	10
Strip makers	2	4
Solution men	2	4
pumpers -	2	4
Dynamo men & oilers -	6	12
~~Oilers~~ Inspectors	2	8
Electrician	2	10
Chief Electrician	1	10
" Chemist.	1	20
Chemist. ~~4~~	4	10
Daily		\$142

Salaries Continued   brot forwd 142

Melters of pure Copper	6	12
Brickers of Ni Fe O's	6	12
Laborers loading etc	~~40~~	70
Genl Manager	1	30
Coal for roasting		75
~~Loading~~		
		341.
		365 days
		1705
		2046
		1023
		124465
		14500
		000
		2000
		1500
		9600
		10000
		162565
	Electrical	174000
	Engr	336565

240000 – Interest .6

Taxes

Ins –

Depcn – 4 pct.

Repairs

9.31
4
3)24

9.31
18.62
27.93

2) 9.31
4.65
13.96

6000) 365000.0 (68.
360000
50000

120) 8000 (66
720
800
720
80

8000000

120.

4) 27.93
6.98

68
50
340.0
365) 3400 (9.31
3285
1150
1095
550

4) 37.24
9.32

4) 18.62
4.65

4) 13.96
3.49

$\frac{1}{3}$

In round nos
$1000 per day -

~~One [illegible]~~

or $68. per hp per year 24 hours

If 1 ton Cu takes 50 hp per 24 hours cost then 1 years gives 365 tons per 50 hp - or $9.31 per ton with the Fe in bricks or cars & Cu in ingots with interest on investment paid -

	Ton Cu	Ton Matte
If 75 hp required then Cost	13.96 –	3.49
If 100 hp " " "	18.62	4.65
If 150 " " "	27.93	6.98
If 200 " " "	37.24 –	9.32

75
500
37,50,0
49,00
86,50

280
175
140
160
190
280
49,000

1250

freight from Sudbury - to Orange say
$5 per ton matte - or $20 for the 25 pct
of Copper in Matte.

Matte Cost 86,50.
frt 500
91,50.

Cost matte.	9150
Cost wkg at rate 75 hp per ton Cu -	349
	94.99
at rate of 100 hp	465
	96,15
at 150 -	698
	98.48
at 200 -	932
	100,52

1680
365
840
1008
504
613200

13.00
5.00
65.00

613

280
30
840

280
23
84
560
644

280
25
140
560
700

120
14
480
120
1680

at the worst $100 per ton

500 lbs Cu at. 13	65,00
280 lbs Ni at 30c	84 00
	149.00

Ni at 25 c — Cu 6500
7000
135.00.

	50.00$
Cop at 10c	
Ni at. 23c	64 40
	114,40 —

Lowest profit 14 per ton.

Surplus profits above interest at full Capacity on highest est 200 hp per ton Cu gives 30 tons daily or 120 tons matte at 14 prof 1680 per day. or 613 000 per year = or 150 pct div —

113
80
9040

8650
8000
692000000

43800 | 105000 (2.40
87600
174000
175200

692000

120
365
600
720
360
43800

365 | 36000 (113
...

8000 tons carried in Vaults at 86.50.
$ 692 000 – used at rate of 120
tons daily – (200 hp per ton Cu) lasts 66 days
say 80 days – $ 113 per day 6 pct.
9040. for 80 days or 1.10 per ton matte
or 4.40 per ton Copper – o

Coal bill 105 000 –

2 lbs per hour per hp at 2.25

If moved where Coal was
1.12½ saving be 52 500 yearly

Cost per ton matte 105 000 rate for
Coal – (200 hp per ton Cu) 2.40 c for Coal

1.12½ Coal 1.20
56 c Coal .60 c

Copper Elect -

Try Alumina Hydrate to form aluminate of Cop or Ni to seperate from Fe -

Try Rozin which is Cheap & powerful acid to sep Cop or Ni fm Fe

acetal. Liquid-
glacial acetic acid. Liquid
acetamide – C_2H_5-NO. - solid
Melts. 78 boils 221. C.

~~Acetic Ether~~

Acetate of allyl. Liquid. "amyl ac is [illegible]"
" " Benzyl-
" " Ethyl.
" " methyl.

Acetonitrile – C_2H_3N – (Cy of methyl)

Hydrate of phenyl – or phenyl alcohol
Cetyl alcohol

Acetic Aldehyde – or Hydride
of acetyl – Liquid –

action oil amber
with Nitric acid
do on amber by
Nitric.

acetic Aldehyde -
Propionic
Butyric - "
Butyric acid
Formic acid
Benzoic aldehyde - ok
Allyl alcohol
Oil Garlic - or. Sulphide of
Allyl — $C^6H_{10}S$.
Allyl Mercaptan. $C_3H_6.S$
Allylamine. C_3H_7N. ok
Oil Almonds ok

Amyl or Fusil Oil ok C_5-H_{11}

Hydrate of amyl - $C_5-H_{12}O$, ok or Comcl Fusil O

Hydride of Amyl - $C_5-H_{11}.H.$

Amylic Ether. Liq - ok

Hydrate of Amylene or Amylene Glycol $C_5-H_{12}O_2$ ok

Oil anise ok

Amarine - when HCl is poured on amarine Oil formed. which gradly solidifies on drying & may be drawn into threads on heating - it distills without decomp as an oil solidifying to transparent mass - Pharogh,
Watts Vol 1 162 -

In distillation of Amber - there is a white substance produced as well as a Bitumen - white sub has 95.6 pct Carbon 6 al H - ~~[illegible]~~ it melts Nitric a Resinifies it.
Watts Vol 1 162 — File

Anchoic acid (fatty) -
Anchoate Ammonium - dis water pbly non-
Electric. amorphous - Barium Salt.
Transparent films - dried over H_2SO_4 - forms
white opaque Mass like Porcelain -
Watts 1 290 Phonogh.

Anchusin - Coloring Matter of alkanet
root, (Anchusa Tinctoria) amorphous
dont fuse softens gives of iodine like
Vapors at 60 C - & Carbonizes higher temp
dis Ether - Turpentine + fixed oils
Fils Watts 290 - Vol 1

Angelica Wax - phono Watts 1 242

Nitranisic acid. ~~carefully heated~~
it melts at 180 C. heated further
sublimes - partly blackens & decomposes
Fils - Vol 1 302

Anisic alcohol. Converted by Sul acid into Resin hard transparent

Phono - Vol 1 303 p6ly N4 -

Anisol - C_7H_8O - Glos. Liq

Anisulmin - Brown product from extracting anise seed after previous treatment with alcohol, Water + HCl. with aqueous potash & precip alkali by acetic acid - Fils - Vol 1 306

Hydride of Anisyl pentchlophos alcohol. thickens it & finally gives black pitchy mass.. Watts Vol 1 307

Fils

Annotto = Nitric acid. pitches it - fils
Watts Vol 1 308

Creosate, JOE OK

Asphalt Oil - JOE

Formate of Methyl JOE

Ethylamine. C_2H_7N - JOE
Tetrylamine. $C_4H_{11}N$ "
amylamine - $C_5H_{13}N$. "
Octylamine -
phenylamine - C_6H_7N: want them desirable
Ulmic substance its [illegible] aniline oil & [illegible]
Cyanide Ethyl
" Methyl
Nitrite amyl - JOE

Cuminol ok Joe
~~Tq~~ Tetryl.
Wood Spirit, ok
Phenylic alcohol.

get Sulph of Benzadine in Room 6 that dont melt & find solvent

---

Carbonize pea & bean material see if pub much. & can be squirted

---

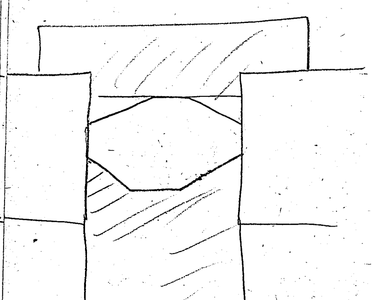
Di Nitro benzene - Joe
Benzil - "
Bergmat Oil "

Squirt Mushrooms

Dippels Oil - Joe

---

pyridine
Picoline ✓ Get Liq. in Dippel oil Joe
Lutidine ✓
Collidine ✓



Black crystaline Compound left in retort Hexaglyceric Bromhydrin

Fils - Watts 1 668,

Bromaform - have it pass through tube containing amalgamated Copper to stop - Effect on Hg of pump Joe

Butyric Acid Joe OK E

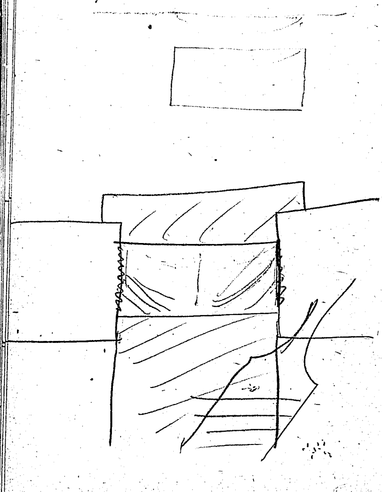
Oil Cajaput. OK Joe

Oil Juniper OK

Oil Thyme. OK Joe

Camphol - Joe

Sexchloro-camphor resembles white wax - phono -
Watts Vol 1 728



~~Where~~

Camphoramic acid -
melts to transparent vitreous mass
phano Watts Vol 1 729

Camphor Resin - a non Volatile
Resin due to action Iodine on Camphor
phano + file Watts 730

Camphorone - - Goes a
~~watts~~ - Liquid -

oil Caoutchouc Goes

Caproic acid - Liq - Goes

Capronitrile - Goes Liq

Tetrachloride Carbon Liq -
anml Cap in Tube — Goes

Bisulphide Carbon - Joe
Lookout for dissolving Rubber.

Cardamon Seed Oil Joe

Oil Caraway - Joe OK

Ceropic acid - waxy mass
phono - Watts 1 836

Cerosin - wax of sugar Cane
very hard brittle MP 82 Cent
Watts 1 836 Phono

Insulation - Chlorinated Cerotene
from Chinese wax Watts 1 836.

Chlorocerotic acid - Chlorinating
Cerotic acid fm Beeswax. Transparent
gum - phono - Watts 1 837

Cerylic alcohol. Joe

Cetraric acid - formation of Ulmic a by H_2SO_4 — Watts 1 839 fol

Cetylsulphate. of ~~potassium~~ not fusible - pbly ng fol - Watts 1 842 -

Trichloroacetic acid Joe
+ for dislvg Carbonite.

Chloral - thin oil - Joe
+ for dislvg Carbonite -

Chloralide - dis Carbonite solid

Mix Syrian with Idioform will a fil heated melt. If Iodine Disolved in Chloroform to Syrup or in Turpentine or Bisul Carbon + Syrian Evap will fil melt, or powdered Iodine + Syrian just moistened with Chloro or Chetty - melt, S

Cinnamene - Volatile oil of Liquid Storax = Joe

Balsam Peru can be saponified phono - Try all balsams.

Chlorine passed ~~into~~ in diffused daylight over dry Cinnamic acid produces tough greasy substance, phono - Watts 1,984.

Oil Cassia - Joe

Citrate of Magnesium gummy amorphous Mass - phono Watts 1998.

Oil Citron
" Citronella Jos
Oil Cloves

Petrolene pbly is Carbonite.

Comenic acid or Meconic acid
& Comenate - ~~good base~~
for fils - see Watts 1, 1104

Oil Rosemary Jos

oil Coriander seed Jos

Oil Cress -

Cumol Jos or Cuminal

Cyanide of ammonia -
& deposit ~~ulzimic acid~~ Jos

Cyanide of Ethyl - propionitrile Joe
or Hydrocyanic Ether
very poisonous

Cyclamin - may be good for fils
Watts Vol 2 294.

Furfural - Joe Liq

Oil Wintergreen ~~Joe~~

Gentianic acid Carbz
without much decomp W 2 830

Glycocine - can be carbzd before
much decomp - W 2 902

Haematoxylin - from Logwood - we have
some Conc Extract solid - Sol alcohol -
good for Joe & also possibly extract
an amorphous stuff squirt fils -
Try Benzene to dissolve out everything not
amorphous - Watts 3 - p 4

Haematoxylin has many reactions &
is good base for Sgt fils — See Watts

Benzine – Naptha, Rigolene, 90° – Emmons

Heat ~~Aniline~~ Diphenylamine in
side tube – Emmons

Hydroquinone – Watts III, 213 fils
do 214,

Imasatin – Watts III 245 – fil
Indifuscin – dont fuse – Watts III 249

Common indigo – fils
Sulphindigotic acid – fils
Watts 259 – Vol 3

Indihumin – Watts 3 264 fils

Japonic acid $C_{12}H_{10}O_5$ - the blackstuff which produced by Expos'g Catechin in Caustic Pot. HCl throws it down its sol water Insol alcohol Watts 3 442 fils.

Legumin - leaves shiny Carbon - give dip - Vol III 569

Litmus - base for sgt fil Azolitmin

Luteolin Residue fils sgt Vol III 736.

Malate of Lead phono Vol III P796. 797 amorp - basic salt never crystaline -

Melanic acid resembles lampblack very sol alcohol Ether + alkaline Liqds - perhaps good for sgt fils - Vol III 867

Melasoic acid - black - action of Heat on Caustic alkali + glucose - Soluble in alcohol ? -
Sept files Watts 3 868

Melene - ~~related to~~ Sept files III. 868

Methulmic acid - base for
Sept files Vol III 983-84

Moric acid dec without melt
Vol III 1048 Sol al

Murexan dont fuse
sept files Sol alkali III 1063

Oleamide - phno
Vol 4 191

Pectic acid sgt fil Vol 4 367

Hexmetaphosphate of Lead

a Resin - phono - 4 566

Use phos anhydride for Dryer
& put dry Cy of K in side bulb -
& heat when ready flash - Emmons

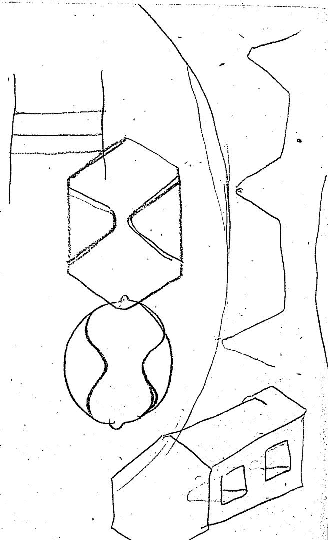
Try Stearate Aniline phono

Oxdze parafine oil with hot nitric
for a fil bilumen —

Uranine - Joe & fels

Fluorescene, " "

Thallene " "



Physalin - Vol 4-634 - Fils

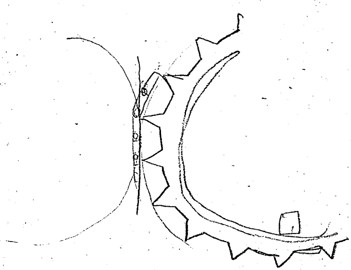
Picoline - goz - flash - all the CHN. Liquids to be used

Stearic acid pitch - black stuff boil down to a very thick asphalt. then dissolve + used for dip fils - all CHNs poly

Try this stuff with Na hot to make a solid for phono

Picolini Chloride - Vol 4 638
Phono insol H_2O -

All the solid Medicinal
Extracts - see MCKTR Catalog
most are amorphous lig
Carbon direct supply &
dupq of Cbzd file, from
stock order
~~If they~~ such as show semi
fusion & shining Clzw - lig
& seperate by solvents the two
Easily fusible material -
starchy matter -



Picrotoxin Decomp without fusion fels 643 Val 4 — Cocculus Indicus.

Picryl — fels 644 Val 4

Nitromaric or Azomaric acid Carbz without. Meltg. adding Nit a on Pimaric acid from Gallipot.

Piperic acid fels - 654 - Val 4

Piperidine a CHN. Liq — Watts 4 655 fleasc. —

Propionitrile - flash - Vol 4 736,
CHN or cyanide Ethyl -

Pseudoveratrine - dip - Vol 4 745

Urates of the CHNs = say
Urate of Aniline - for dip -

Alloxan - dip -
Murexide - good dip

Alizarin
Purpurin Watts 4 750

Puree a Cond Color - a CHN,
Watts 751 - 4 Val

Pyridine - ~~CHN~~ - Val 4 754
flash -

Chlorine Bromine & Iodine
act on the CHN Liquids to
give solids & perhaps many
will be soluble & good for
dip or sqrt fils,

Pyrolartrimide combined
with Oxide Lead - gelatanizes
paper - $C_5H_7NO_2$ = thread
fils & other uses Insulation -
Watts 775 - Vol 4

Pyrotartranilic acid fils.
Vol 4 775 -

Pyrrol CHN - flash -
Pyrrol Red - Vol 4 784 fil
dip sqrt -

Carbohydrates treated with ammonia take up N give gelatinous deposits. Dusart by heating glucose, Milk Sugar with aqueous ammonia obtained nitrogenous products which precip by Alcohol in Tenacious thread fils; Vol 5 467

Only Copying marks in 4th Vol & thence on - without necessity

Verantin fils Vol 5 993
do Halogen Compds & Nitrate

Viscin - alcoholic residue - good base = fils Vol 5 1003 acetulmic acid Vol 6 29 -

Kennelly Table

Terephthalic acid not fusible

Hydroxyterephthalic acid not fusible -

Umbelliferone not fusible,
$C_9H_6O_3$ —

Cholecamphoric acid not fusible - -

Naphthalene-dicarboxylic acid - not fusible.
$C_{12}H_8O_4$.

Hexahydroxydiphenylene ketone - decomp without melting

Anthraflavic acid non fusible

Tetrahydroxyanthraquinone, non fusible

Anthrachrysone "

Anthrol. "a" "

Diphenic acid (iso) - one of them
infusible -

Tetrahydroellagic acid non fusible

Benzoylterephthalic acid "

Aurin - "

Phloroglucolphthalein "

Anamirtin -

Resorcinophthalein - "
(Fluoresorcein)

Metaphloretin - "

Calechin Tetranhydride "

" Dianhydride "

$C_3H_3N^5$ —

Formoguanamine - nonfus.
Anhydroformaldehydaniline "
Dianthramine "
Diphenanthrenazolide — "
Perchlortriphenylamine — "
$C_6Cl_5-)_3N$ —

~~Ceoy~~ Acolyctine
for fits - from Henbane
Extract, Vol 6. 54.

Acrolein combines with
aniline form amorp base
Vol 6 56 —

Flashing —

Acetonitril, (Methylic Cyanide)
CH_3 CN. good — Liq —

Propionitril, Ethylic Cyanide,

Isopropylamine —
Propylamine.
Allylic Cyanide.
Diethylamine —
Butylamine.
Isobutylalamine.
Pyridine,
Pyrrol
Piperidine
amylamine.
Picoline.
Benzonitril.
Parvoline from Dippels oil
Naphthalamine. a. solid

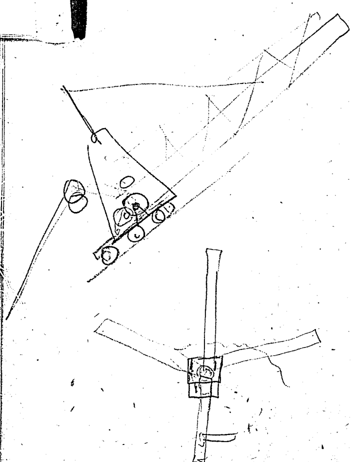
get Schuchardts Frommsdorff + Mercks Catalogues & get all the CHNs —

Have Atwood try Napthaline as Lubricant

Napthaline dissolves Sulphides of Antimony & Tin Iodide Hg Oxalic Succinic + Benzoic acids — Try these for Phonograph Cylinders

Hot Phenol is great solvent for Organic insoluable substances

Quinone $C_6H_4O_2$ this stuff deposits Brown sub Exposed air Especially if alkalized Something in this group for fils — ~~Ath~~



Millers Chem =

p 712. (1617) Ethylenic Sulphide C_2H_4S. Do p 713 all amorphous · action of a-dibromethane or Ethyl bromide on Alcoholic Solution Potassic Sulphide white amorphous substance

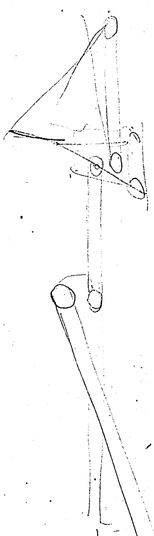
Methyl Iodide & propyl bromide treated with alcoholic Pot sulphide - gives amorphous sulphide insoluble in all neutral Solvents

fils & phono

Dinitroanthraquinone - or Fritzoches Reagents - combines with all Known solid Hydrocbns in Coal Tar = action of Dilute Nitric acid on anthracene. for phono

to get rid of Crystalzn

Try Dippel Oil Salt Carbonate



after acting on Carbide with
Methyl alcohol - try other slight
Solvents to get out all puffy stuff.

Metacinnamene polymerized
by heating in sealed tubes to
392 F amorphous Colorless
Solid high refracting power
destitute smell or taste -
quite transparent softens on
appln heat Drawn out in
threads - Make some for
phono - Insulation - +
physical Experiments,

B-Dinitro anthraquinone - fids
Watts 1st Vol 3rd sup 99-

action of Nitric Acid on a
phenol - a Resin phono
for mixing —

Alcoholic Solutions of Caustic Soda or Potash produce lively action on Dinitrobenzine + black amorphous substances formed which are partially soluble in Alkalies — Watts 1st Vol 3rd Sup 175 —

action of Antimony Trichlor on Azobenzine is converted into Black amorphous substance having Conchoidal fracture Metallic Lustre Sol in Water more Easily in Alcohol.
Watts, 1st Vol 3rd Sup 212

Metamidobenzenesulphonic acid
melts without ~~Dt fusing~~
- amt thin Sulphanilic acid
Sol freely hot water, 1st Vol 3rd Sup
p 227
See 228 Diamidobenzensulphonic acid
Dibromometamidobenzenesulphonic acid
Dont fuse, 1st Vol 3rd Sup 232
also 233 [illegible]
1st Vol 3rd Sup
Tribromometamidobenzenesulphonic acid
p 234, Dont fuse
Tribromometamidobenzenesulphonic a
234 Dont fuse
Tetrabromamidobenzenesulphonic a
234 Dont fuse

Dimethylanilinesulfonic a 235 1st 3rd
Dont fuse

Amide of Tribromobenzenesulfonic acid
241 - 1st 3rd - Dont fuse

Amide of Tetrabromobenzenesulfonic a
1st 3rd 243, 244 Dont fuse
Sol alcohol Easily

~~Cl~~ amide Pentabromobenzenesulfonic a
Dont fuse
1st 3rd 244 Sol alcohol
245 - Nitrode brom ditto

There are a lot of these
Sulphonic acid benzenes
that dont melt / described
in 1st 3rd

Thiocarbamidobenzoic acid
fils & phonos — 30 lines down
another Compound —
1st 3rd 269

Azoxybenzoic acid
not fuse

1st 3rd 277

Diazoxybenzoic acid good —
p 277 278, 1st 3rd
just like Melissic or Azulmic
acid Sol in ammonia
amonium salt dries to a
Varnish Green & transparent
See Barium Salt most electric Sub Known
jumps in dish for hours
also below - Mononitrodiazoxy benzoic

9

See Carbon Hydrate from Cast iron
action Nitric acid causes solubility
in it's fils, 1st 3rd 405

Chrysean 1st 3rd 463

Benzenyl-imidoxim-Carbonyl.
Dont fuse.

Carboxy-benzenyl-azoxim, propanyl.
Carboxylic acid - Dont fuse -
Watts New Dic Vol 1 424

Dont forget to dip fil in a Carbon
Compound of Lime or Magnesium to
produce a semi- or non conducting surface
on fil to prevent Geisler action,

Chlorine passed in difused daylight over dry Cinnamic acid forms a tough greasy substance Watts 1st ~~Vol~~ 984 —

Citrate of Lithium phos}
Magnesium phos}
Nickel phos}

Di Potassic Citrate acid — present Electrification phos —
See Vol 1 999 — Watts file Insta Phos 1001 - 1002 1004 —

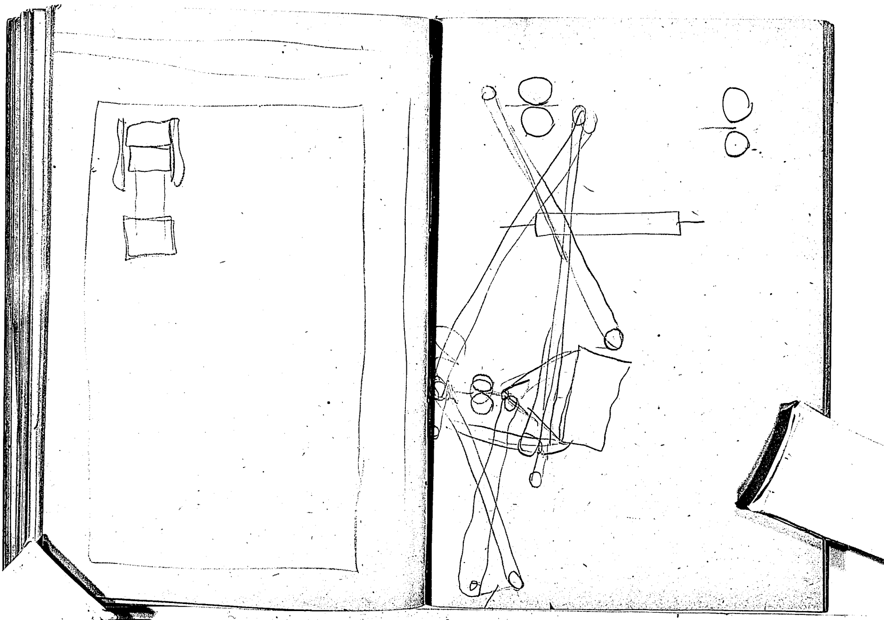
Acrylic aldehyde forms solid white amorphous Compound with "Ammonia Vol 1 112

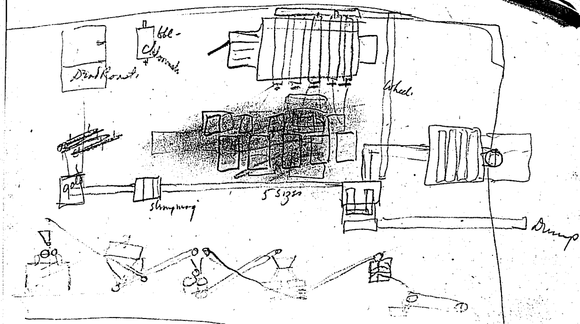
Allophanate Glyceryl — phos mixer Watts 1 p134

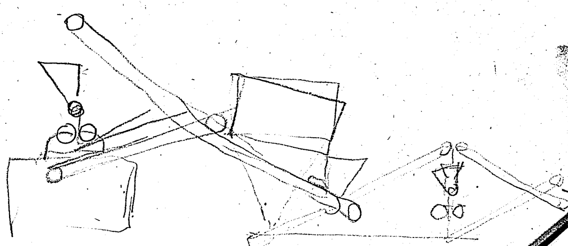
Anisic alcohol action of Sul acid
phno - Watts Vol 1 303 + $ClZn$

Aniculmani fils Vol 1 306 -

Arachidic acid - like porcelain
phno - Vol 1 353 See 354
soap made in France

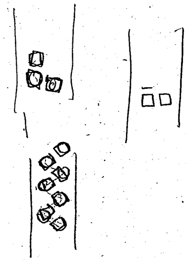



Dead Roast.
Wheel.
5 sizes
Dump



45
31
45
135
1395

1395
2240
845



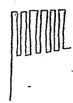
800 lbs –
380 lbs from org

31
20
620

2240
620
1620
380 — 4 1/2
1220 – 2 1/2

< 31
4
124
16
140

140 lbs per ton. — –23 lbs –
75 " "per ton – 41 .64. 2 Units



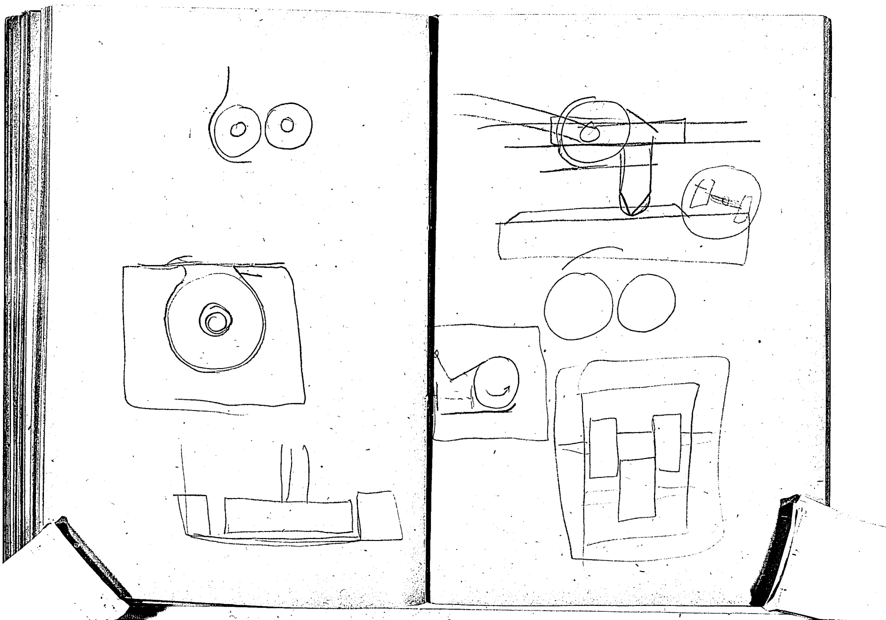
140) 2240 (16. lbs to lb
140
840
84

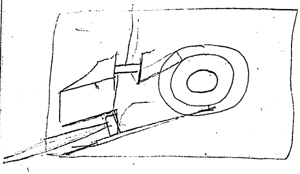
17
33
50
118

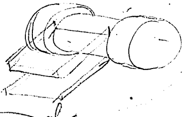
16) 380 (23
32
60

75) 2240 (298
150
740
675
650

30 lb) 1220 (40 1/2
120
20







Col Na

CaCl-

ResNa-CaCl-

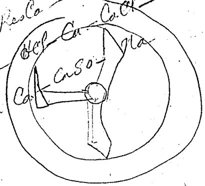
NaCl- ResCa - CaCl-

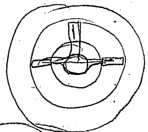
HCl-Ca - Na-

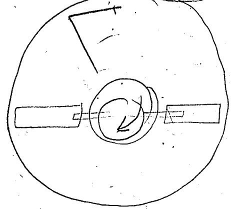
SO4-Na- CaSO-

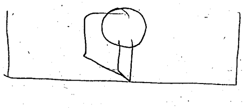
Ca

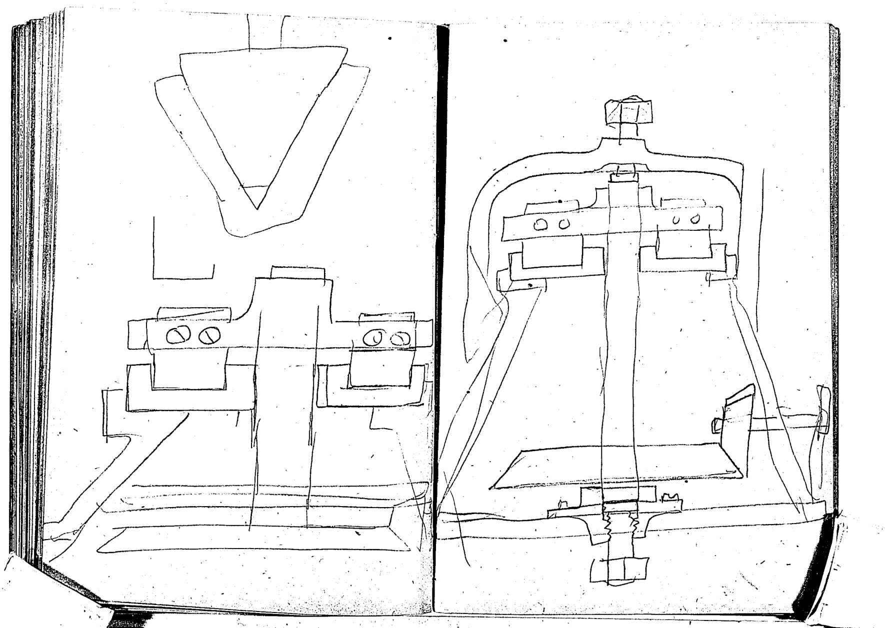
SO4Na

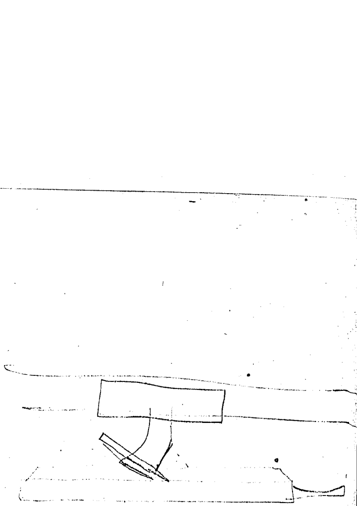








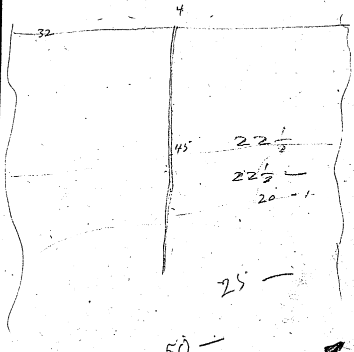




22.40
5
75
25
20
500
350
11.0
3 1/3
400
20
15500
6
93000
25
.31
25
75
775
20
0
65.60
20
68.5
2240) 1550

1/3

270
225
100 —



25 —

50 —

135 tons hour
33 1/3 of day

1382
40
55 - 2 81

1382
500
88.3

2646

60 tons

44 tons

55 - 33

20) 2646 (132
20
64
60
46

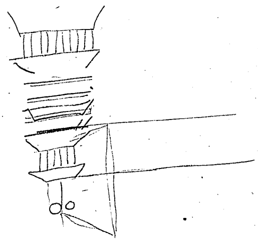
1382

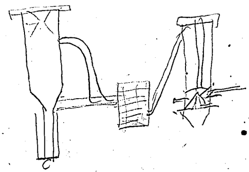
4000
20
55) 80000 (1454
55
250
220
300
275
250
220
0

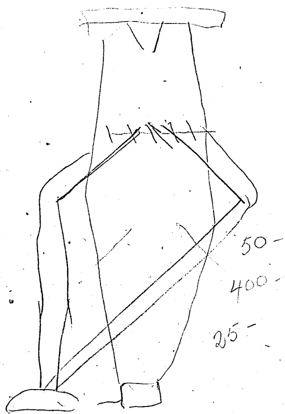
1454
72
1382

55) 4000 (72
385
150
110

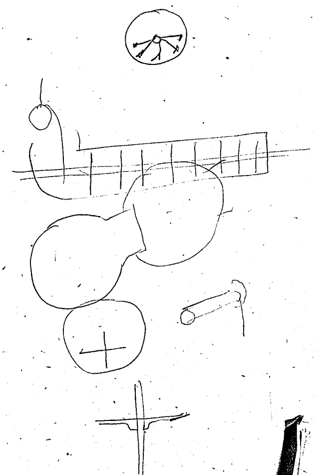
1454







50-
400-
25-



80

10.03

16
5

$5.00

50-

7.-

100.03-

50.00
30
1500-

30-
30-
75
145
50
195
100
295

12-

20-

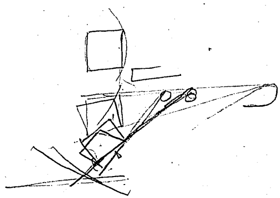
125000

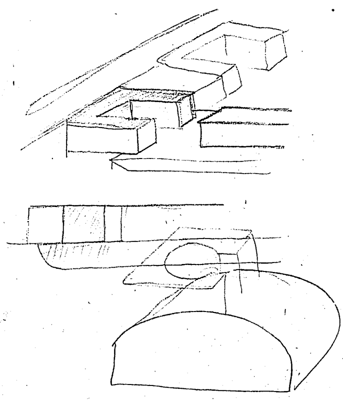
17 $750

7500 175000
7500 500 750

17560
11 2

3 trains
4 trains





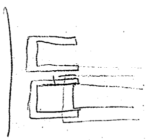
2'

6 40
12

45

300

7'



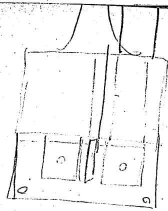
30c 275

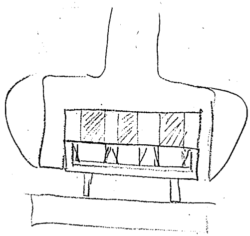
1500
333
4500
4500
4500
499500

4995
60
2240) 29974 (129
2240
6570
4480
20960
201

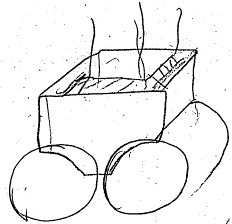
2400
12
4800
2400
28800
1728) 57600 (33.3
5184
5760
5184
5760

129 tons





187
600
112,200



75
40
300,0

600

320) 60000 (187
320
2800
2560
24

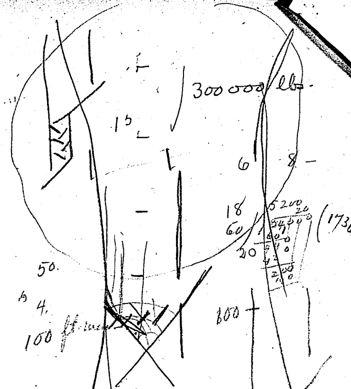
3. 129-

90- 180

40
8
320-

320 inch Beam
in car 60000 lbs

216 ft min surface Vel
or 187 lbs sqr inch



300000 lbs -

15

6 8 -

18
60
5200
20
5400
(1730

50.

4.

100 ft

800 -

8) 1730 -
216 Rev

7.5
20
150

30 inches

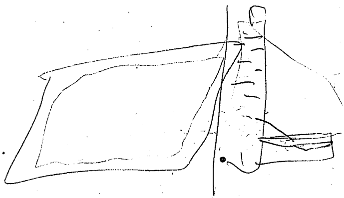
216 ft -

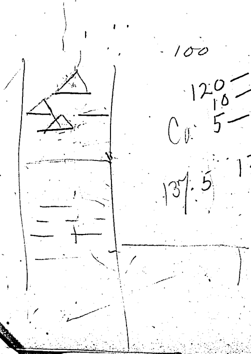
8) 60000
7500

7500

40) 16000 (lbs -
400

200 lbs sq inch

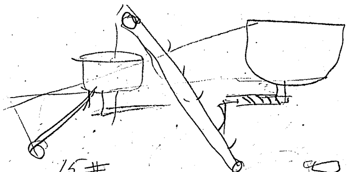




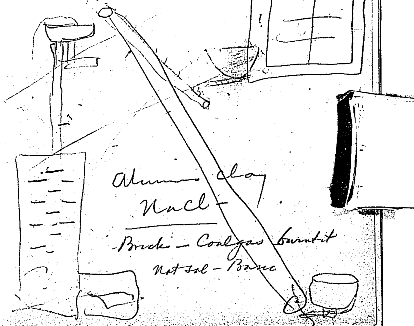
100

120 —
10 —
Ca 5 —

137.5 120 —



15 #
137



Alumina clay
NaCl —

Brick — Coalgas burnt it
Not sol — Base

3 lbs

700 - 1c

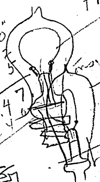
5 10 - 50 -

1/2 -

31
10
3 | 42
14 cents

22 | 78 (3.522
58
36
34
17.4 8
20 6

60
120
67
5



80 | 2.47 (
2.4

tons

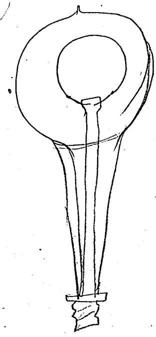
tons 12

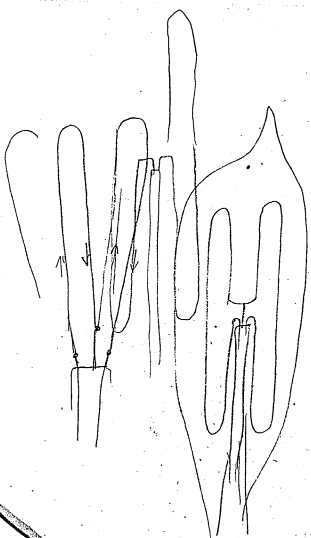
tons

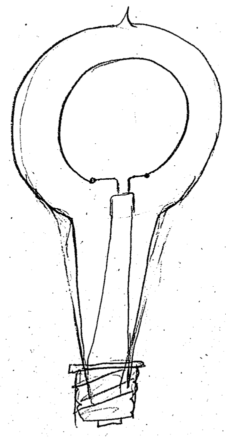
352 | 4200 (1.19
352
680
352
3280
3168

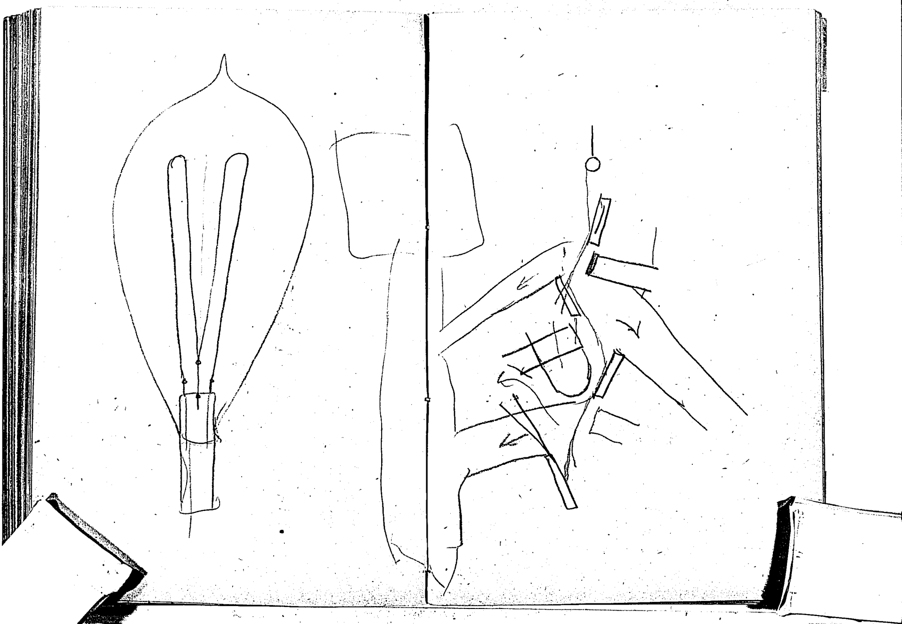
Portchester

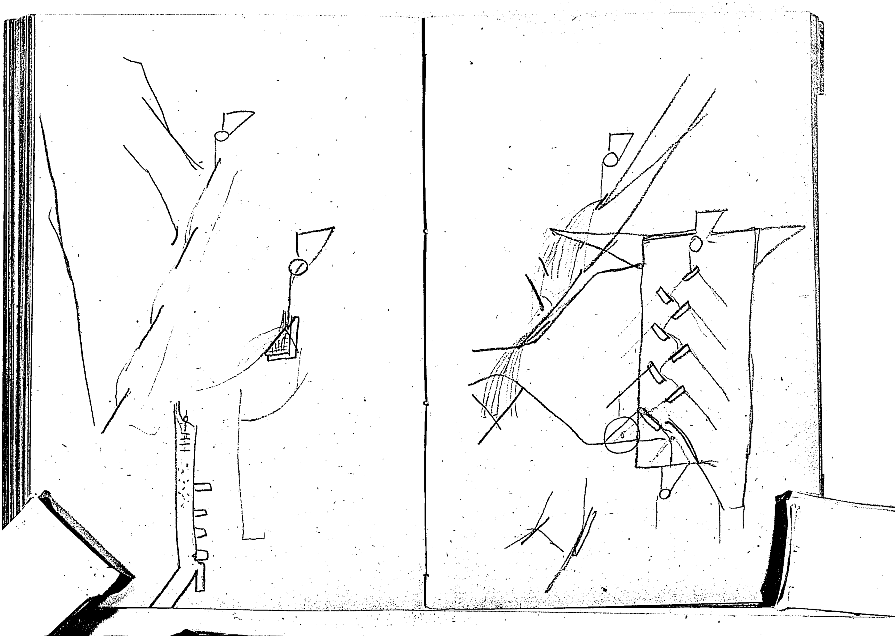
070 | 247 (352
210
370
350
200











If 400 ft gave 129 tons 41 Hp & 23% effy
+ some inch stream.
then
Assuming 1 inch stream as
the best thickness —
then the best results will be
obtained by slowing the
Rolls to 300 or thereabouts + increasing the
pressure until the product
gave 45% this would give
say 90 tons -

It is probable that
200 feet per minute
Surface Velocity - and
a feed to give 1 inch thickness
or 65 tons for 10" + the use
of 20 inches or 130 tons &
the use of 4 times the pressure
will produce the best results

You half the speed you can
double the feed double the
pressure and the horsepower
will be just the same —
but by[?] now have twice the
pressure on each particle +
a greater grinding slip
in addition —

If it took 40 hp for 129 Ton 23%
then it will take 80 hp to double
the pressure to get 45 —
this will narrow the stream to
give but 100 tons —
if you increase to 20 inch
you get 200 ton but you
must increase the pressure
in propn hence 200 tons
160 hp 45%

With any given roll

The thickness of the stream possible ~~is limited~~ between the roll has a limiting point, with a given pressure

The greater the pressure the sooner the limit —

Doubling Dia of the Roll & Keeping total pressure the same + surface the same. The limit is twice as great, a thickness of stream is attained —

Or Slowing a 24 Roll going 800 to 400 permits of doubling ~~the stream~~ thickness of stream

1 thick

129 tons 10 2240

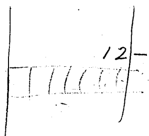
450 feet

150
31
150
450
4650
(124 -

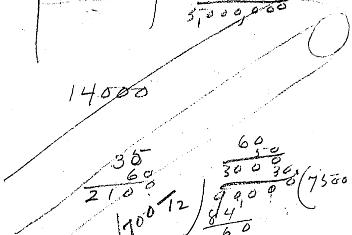
(3111

1728
3320

450	129 —	100 —
12	100	125
900	60	150
450	75 —	175
5400		
	150 —	350 —



1000
5000
5,000,000



14000

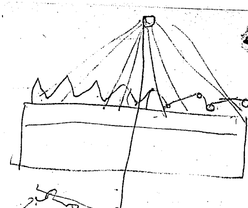
35
60
2100

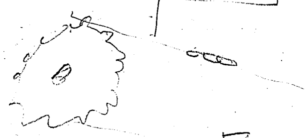
2100000 (700

12) 60
50
3000 30
9000 (7500
84
60
60

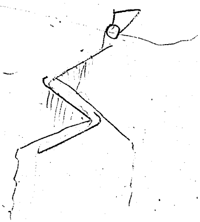
3 yrs) 2100000
21000
000 750 —

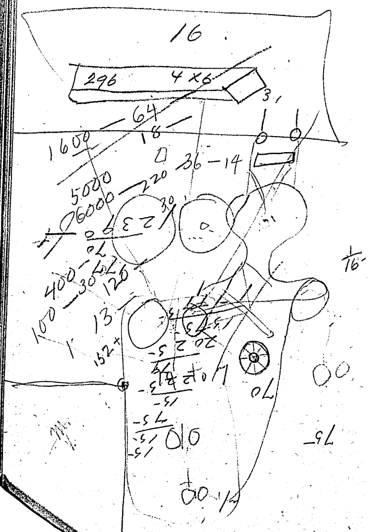
7500) 14000000 (1866.
7500
65000
60000
50000
45000
5000





600





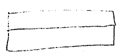
Michagamme. 150 000
60 000
Humboldt - 150 000
Cliffs -
Split Rock — 200 000
Bichelinville 50 000
Croton 350 000
100 000
Brevolier
Lachoque 10 000
85 ~~Pt Henry~~ 175 000
400 Benenot 300 000
Mosiac 100 000
Pt Oram 25 000
Weldon 25 000

1,695,000

31

1 / 15000.

100 - 15 - 3/4 of 1% —



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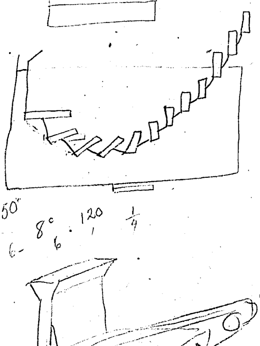


2.

10
70
40
28
300
840

200000

50"

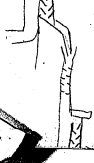
5 6 - 8 6 . 120 1 1/4

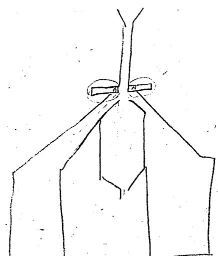
2

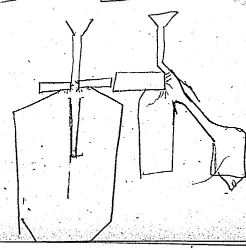
5.

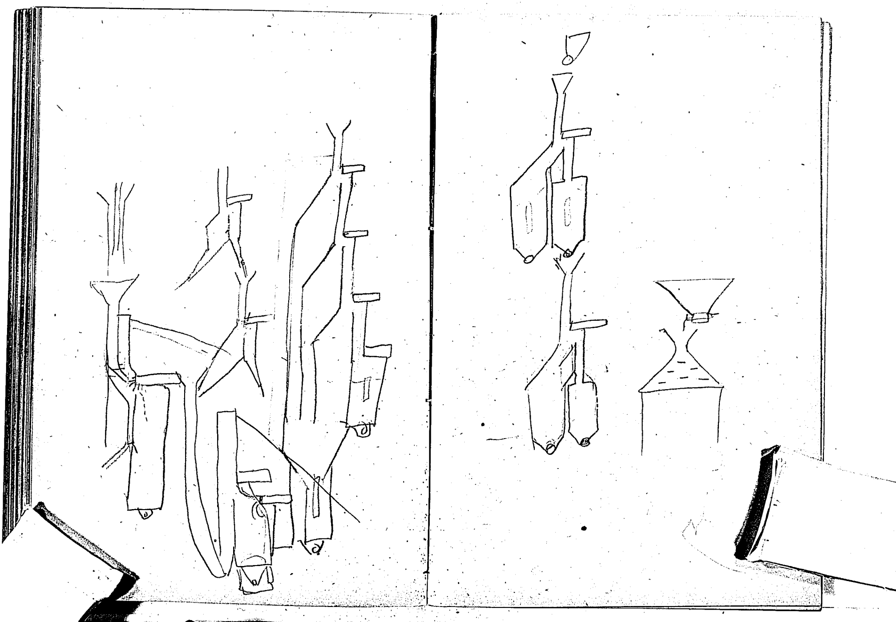
3000

240

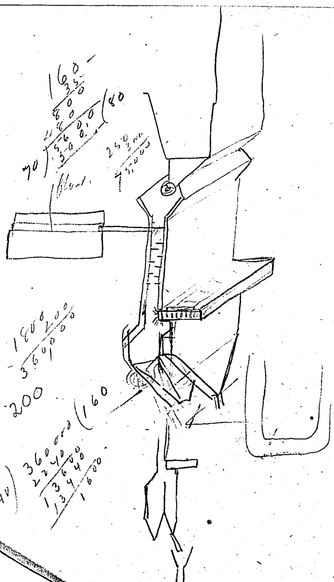




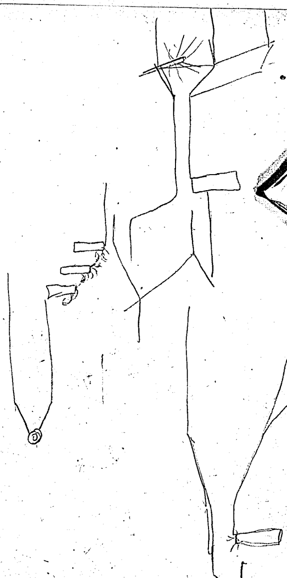




160
35
80
80
5600
5600 (80
70)
Blank.
250
300
75000

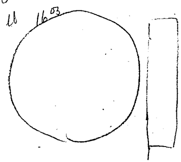


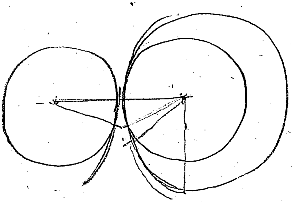
1800
2000
3600000
1-200
3600000 (160
2240)
2240
13600
13440
1600



20 lbs $\frac{1}{100}$ pt of wax

1 lb 16 oz

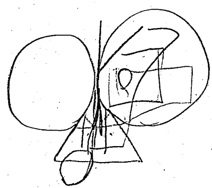




120

110

220 —

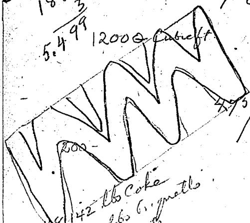


58 lbs — 3 — 2
200 lbs 9 — 180 —

13,900

1833
3
5.499

12000 Cubicft



3.75 Cft Coke
1 Cubft briquette

495 / 1200000 (2526

548142 lbs Coke
505200 lbs Briquette
2526 Cft briquette
9472 Cft Coke

2526
200
505200

2240) 548142 (244

2240) 505240 (225

25.26
217
17682
2526
505.2
548.142

7620

3410

400 tons mag ore
500 tons Anthracite
900

18910 (4
8960
950

2526
375
310
4
1240
17682
7578
947250

469 3410
1240
21.7

31
20
620

110
31
110
330
3410

Magnetite

244 tons packed Coke
225 " " briquettes
2526 Cft briquettes
9472 Cubft Coke 110

620
505
3100
3100
34100

2240
620
1620

470 8910 891

15000 - Eng
22000 boiler -
3000 - pump -
3000 Condenser
10000 - Engine & Dynamos
6000 piping -
10000 Dynamos
7000 Motors
30000 Rolls -
25000 belt screens
12000 - Separators
60000 Furnace
20000 Furnace water jacket
15000 Dryer
25000 Roaster
18000 buddles -
50000 Bldg -
15000 Lodgings
8000 RR
10000 Shops
35000 Belt Conveyors
30000 Extras

419000

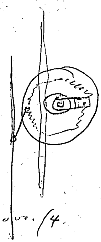
500000

200
300
600,000

Buddles

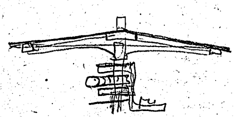
25

25
500
12500



24) 10000 (4

2



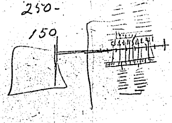
mining 25
40 mile mill - 25
Concentg Frac. 025
Drying - 02
~~Roasting~~ 10
Magnetic 1
~~Screening~~ 3
~~Buddling~~ 5
Extra
2000) 250 (2000
13

75c

1.00 all Cost

10

2500
-200-
250-
150



175
13
525
175
2275

500-

2,000

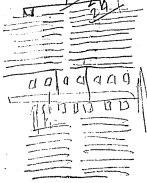
24

2,500,000
2400
60
40

25

175
24
700
350
4200

6
24000
450
24000
120000
96000
24) 10824,000 (451,000 per hour
96
122
120
24
24

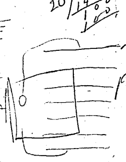


3) 451000
20) 15000 (750
1410
100
100

750
200
150,000

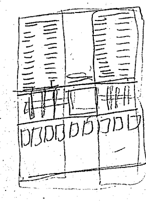
75 tons

450) 451,000 (1000
450



6 - 451000

40
6
240
120 long
150 acres



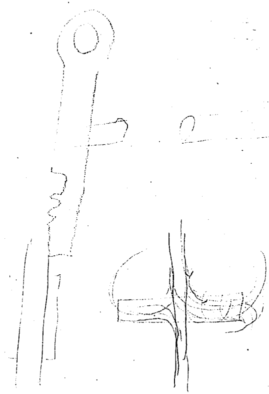
451

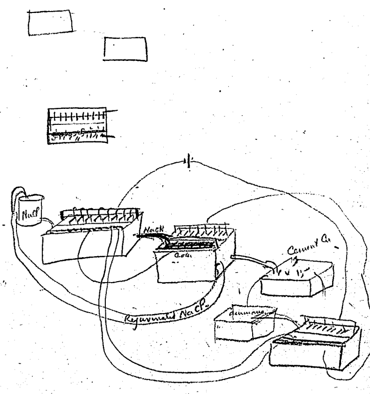
Notebook, N-90-01-04.7

This notebook covers the period January-May 1890. All entries are by Edison. The book contains extended theoretical notes about electricity and electromagnetism, including an entry in which Edison compares his own theories with those of James Clerk Maxwell. There are also notes and drawings relating to unidentified electrical equipment, ore milling and bricking machinery, electric traction, and electric lighting experiments for both incandescent and arc lamps. In addition, there is a list of chemical compounds to be tested. The front cover is labeled "#580." The inside front cover is inscribed "#580 T A Edison Jan 4. 90." The pages are unnumbered, and the book has been used in both directions. Approximately 160 pages have been used.

#580

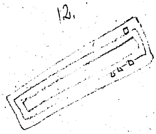
TA Edison
Jan 4..90

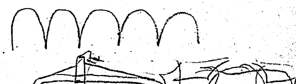


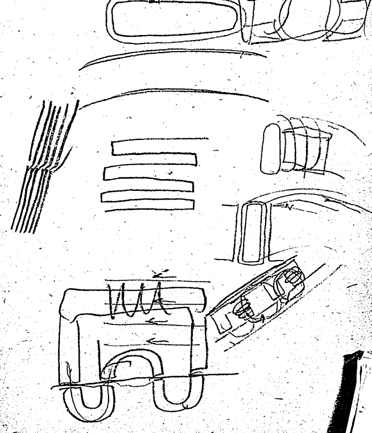


5

12.







[THIS BOOK WAS USED IN BOTH DIRECTIONS. THE FOLLOWING PAGES WERE FILMED FROM THE BACK END FORWARD.]

N-90-01-04

12 - 55 c
160. 64
119
500)3200(64
3000
2000

1300
8
130)1040.0(80
104

10
25
15
15
65 15

350
350
500
200
35)1400.0(400 tons
140

400

Side tube in Lamp - + Carb Compound

Albumen absorb H_2O before goes to Lamp

alcohol (absolute) - dissolved fused Chl Calcium saturate, then Chill out ~~an~~ a Calcium alcoholate, in Crystals which on heating give off only pure Carburetted Hydrogen
Watts Vol 1 p 80 alcohol must have no water-

---

ammonia aldehyde - Resin

Analine oil -

Cumedine

Cyanimide

Naphtylamine

phenylamine

Triphenylamine

Picoline

Piperidine

Pyridine

amarine

amarone

amylate Potassium

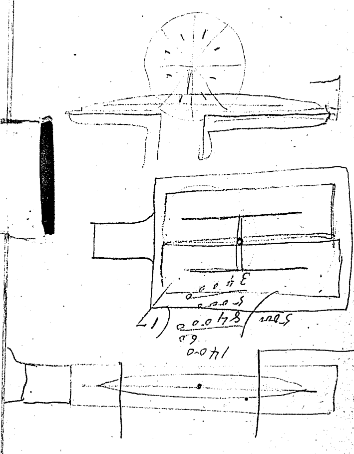
do Sodium

anise Seed

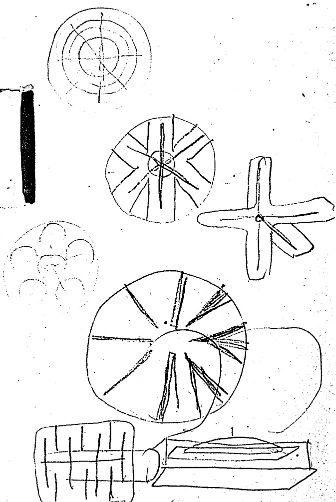
Benzoic acid heated with Caustic Lime
gives of Benzol

Phtalic acid heated Caustic Lime

Dry Distillation Quinic acid
Benzoic gives ~~[illegible]~~ [illegible]



Camphor -
Caoutchouc, dry
guttapercha dry
Mellone
Idioform
Chinoline
Rosin -
Amylate Soda -
Conine · C H N
Copaiba -
Tolu - Balsam
Peru
Copal -
amber ch



Cyanimide C,N,H.

Cyanide of metal

Cyanide amyl-capronitrile
C H N

Solid Chloride Cyanogen
" Bromide "

Dammar Resin - Cowdie gum,
gum of Dammaral C, H,

Benzonitrile

Elemi Resin

Formate of ~~Lead~~, Barium Zinc Potash

Butyrate " " "

gum Euphorbium

Cholesterin

Ethal -

Gum Galbanum

Hydrobenzamide CHN

Hydrocinnamide - "

~~Hydrobenzamide CHN.~~

Pyrene,

Iodoform - Cyanide of Silver

" Hg

gum ~~[illegible]~~ "cyanogen"

Napthalamine Alpha Bell

Linseed Oil -

Lophine - CHN pyrobenzolin

Lupulin -

Mastic

Melam — CNH

Beeswax

Spermacetti.

Chineese wax -

Stearic acid

Paraffine slightly mixed with. following - also Rosin melted of Paraffine forms - gasoline, Camphor, Aniline, Bisulphide Carbon - Turpentine; Indol - Naptha -

Paraffine oil - amyl -

Chloral Hydrate, do + camphor

Chloroform. do Chloroform + Turpentine

menthol - Lemon,

Oil Cassia, Wintergreen,

Bergamot,

Mellone - good - gen

of - n Cy + Hcy -

Mellonide Hg - do Ag -

Gum Myrrh —
Carnauba Wax

Stearate Soda
" Alumina
" Lead —

Phenyl-Carbamic acid
gives of aniline C.H.N
do Salicylamide
" azoxybenzine
Indigo —

distilling

aniline Soluable in Colophony
hence make a salid of Rosin & Anilin

Diazobenzine C.H.N. or azophenylimine

Aniline Blue - CHN
" purple -
Red
all the Aniline Colors but black

Cyanide phosphorous
Venice Turpentine
Burgundy pitch
Coal Tar
wood Tar
asphalt pitch
Syrian asphalt
Piperidine - CHN

5400
7500
12950
1500) 25890 (17.12
15000
10890
10500
3900

300 — 18
500 — 15
350 — 20
350 — 17
1500 — 2) 37
18.5

185
700
1295

1295.00

618 tons,

2400
17
16800
2400
66) 40800 (618
396
120
120 — 66
54

450
400
350
300

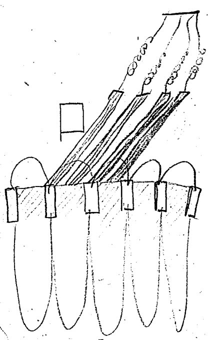
7200
8000
5950
5400
1500) 26550 (17.
15000
11550
10500
3000
18
2400
300
5400

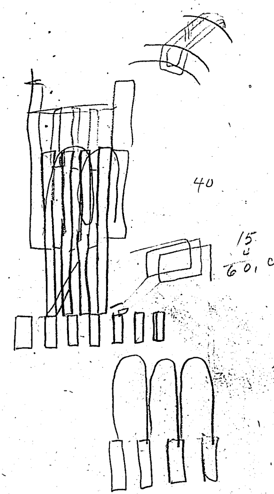
4500
16
2700
450
7200

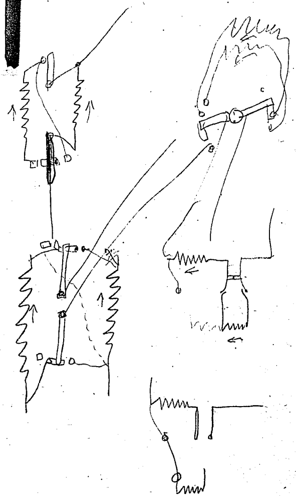
350
17
2450
350
595

19%

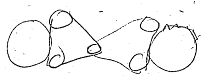
9200
8000
5950
5400
1500) 28550 (19
15000
13550
13500
1550



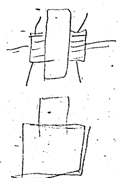

40
15
60, c



patent,

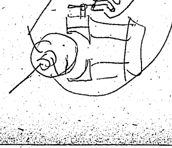


! patent.

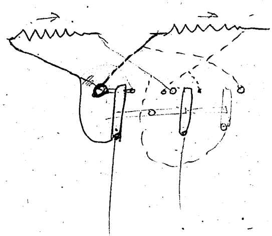


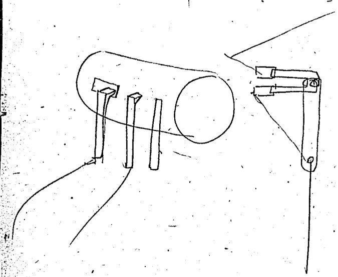
2nd pat

Suspension 3rd



4th patent,
patent,





Inch

2) 22.3 — 10 deg – 1 watt

2) 11.1.5 — 20 "

2) 5.5 7 — 40 "

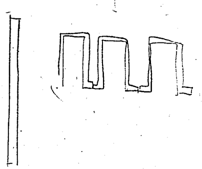
2.7 8 – 80

2" per 100 deg 1 watt,

1 watt

223"

Each deg Fahr



223 –

10 deg fahr 1 watt.

6 –

32 Watts $\frac{1}{20}$

3

480

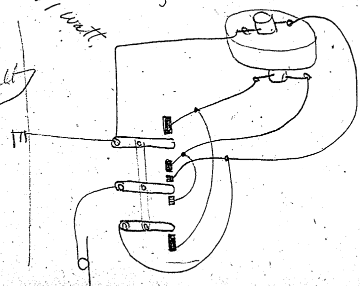
180 –

$\frac{1}{100}$ of Volt, –

$\frac{1}{10}$ th Volt

$\frac{1}{10}$ volt —

25 – $\frac{1}{4}$ Volt



16
4000
66) 64000 (970
594
462
462

4000
17
28000
4000
66) 68000 (10.30
66
198
198
20

2200
18
17600
2200
66) 39600 (600
396
396

250
9
2250
1450

400) 25

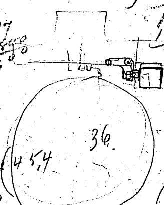
4500
16
27000
4500
66) 72000 (1090
66
6
594

800 — 16000
600
800
2200

10800
13600
2200) 40400 (18.36
2200
18400
17600
8000
6600
14

18
600
10800

17
800
13600

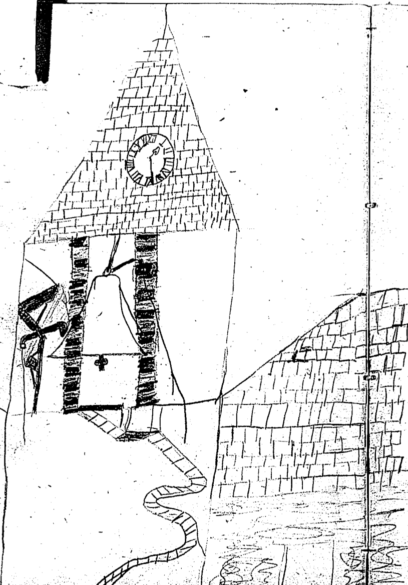


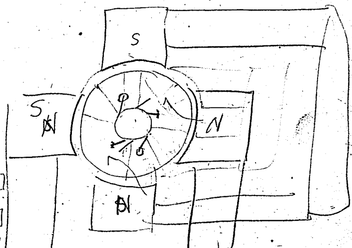
36

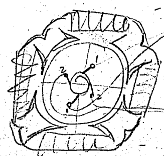
22) 1000 (45.4
88
120
110
100

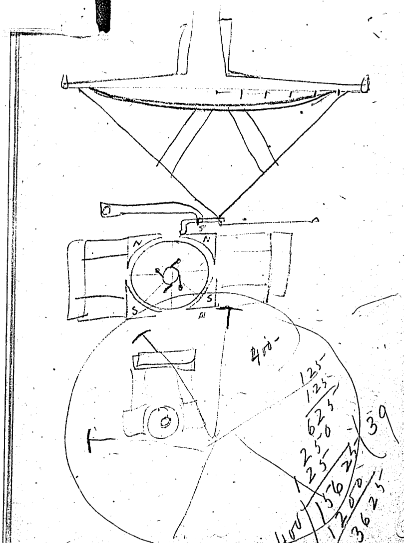
22

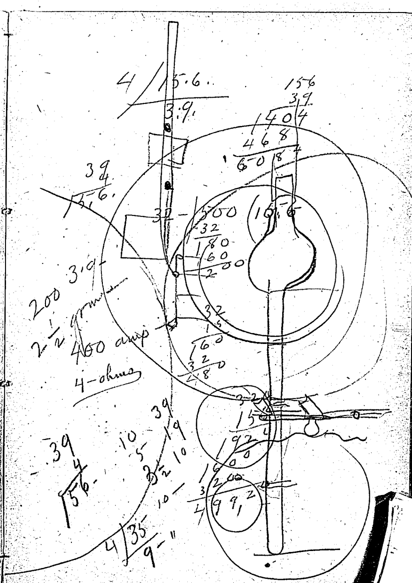
1636
2200
3272
3272
66) 35992 (545
330
299
264
350

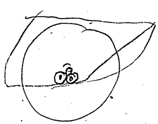


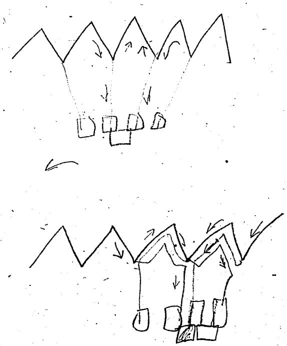

S
S
N
N
N

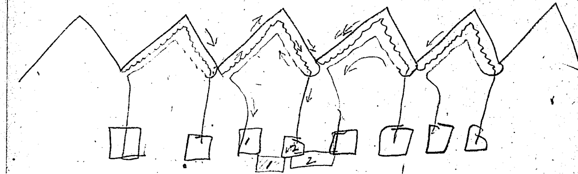



N
N
S
S
400
125
125
625
250
25
39
400
156
23
1250
3625

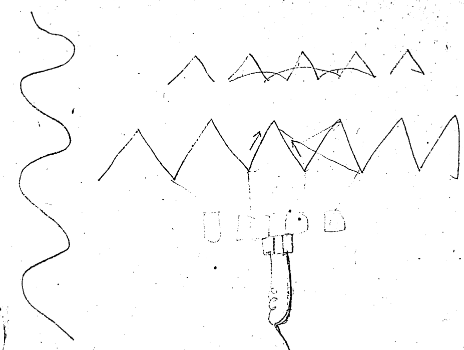

4/15.6.
3.9.
156
39
1404
468
6084
39
4
15.6.
32
300
16.6
200 3.9
2 1/2 grm
400 amp
4-ohms
39
4
156
10
5
39
19
10
4/35
9-11

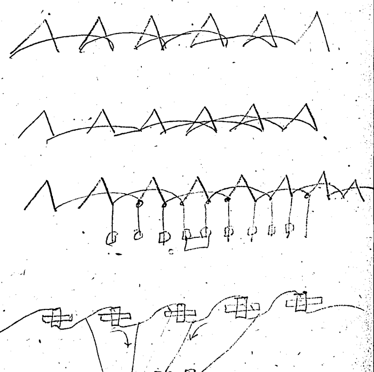


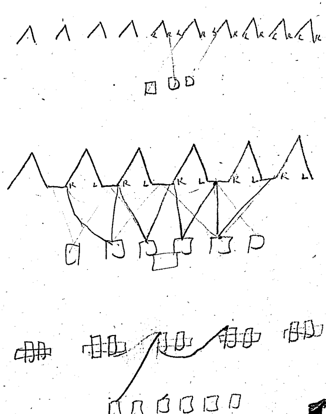




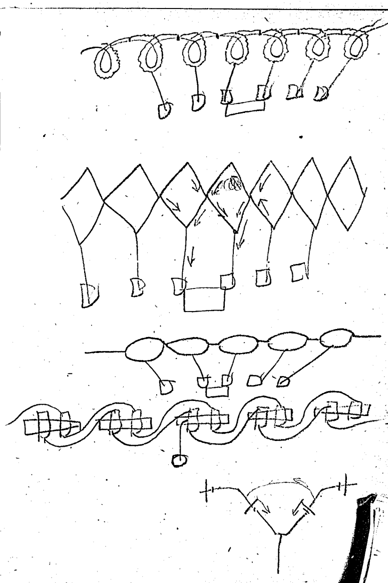
1 of 1 neutral nospank

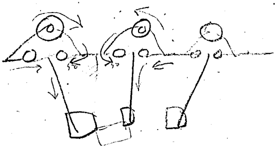


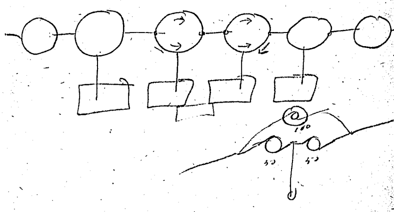


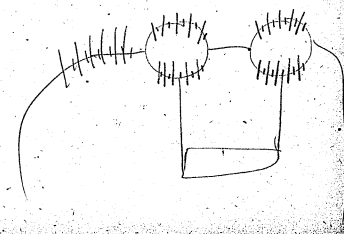


5.7 lbs 1 C Coke –









125
175
100
50
250
125
25
50
50
950

175
125
30.0

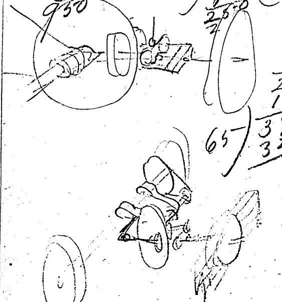
100   33

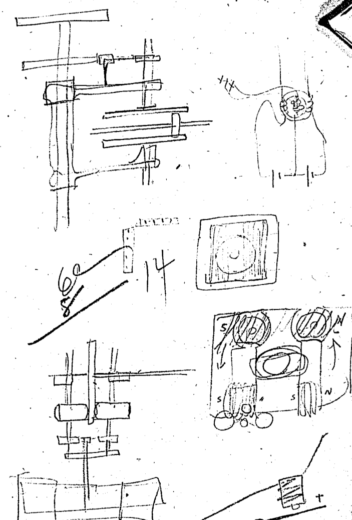
30

70) 950 (13c
70
250
2

13
20
260
26
1.30
390

65) 39
328

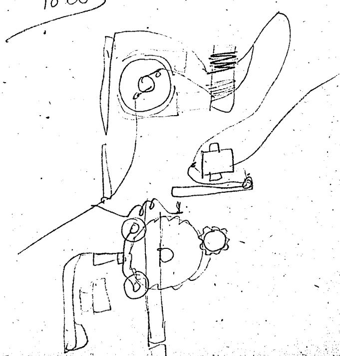




49
20
15 / 980 (65
900
80
75

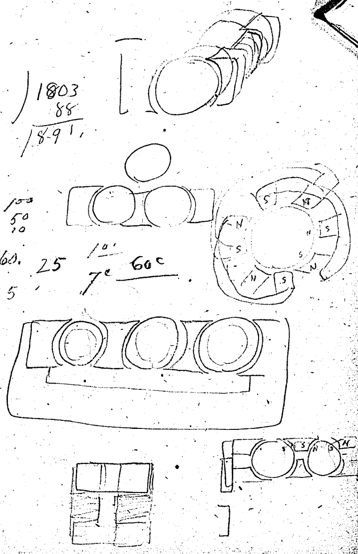
2
25
13
20
260
130

4 8.
10 lbs



1803
88
1891

100
50
10
160. 25
5
10
7c 60c



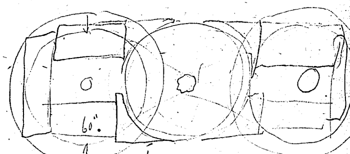
8
50
4000
2000

5600 lbs
2
1200

3

400
80
32000
16000

1 mile - 500
5 -
10



240
80
1920

30
4
240
30

20

24
3
72

45
3
35
18

18.

72
12
144
72
864

864

76

Brown

You are to keep a book in which you enter
Each day the following -

Total No of Each Volts of Lamps of a days
photometer run - This will show the average
Volts of the Lamps.

2 The Volts used in Exhausting Lamps.
The first pegging in should be 110 Volts
and finishing 160 or 175 Volts.

3rd Report if any Lamps go to dull red
on 1st pegging in - if so what proportion
Note the Resistance box that does this
its number on the aisle -
Note how many pegs they go up on
average before filament becomes red
Note general Condition of boxes if they
are regular & do not have places where
there is too great a jump of Candle
power =

4th Note average time before getting
Vacuum before pegging - also if they

(2)

peg in before tube is solid - If they seal off ~~when~~ before tube is solid - ~~also~~ and what percentage roughly they do this = also what they do when pumps lag =

5th = State of Mercury - of swabs for cleaning tubes - If oily = test Mercury by running in smooth writing paper I will show you about this -

6th = Note everything done in pump room - from the 1st day you take hold, and then every change thereafter that takes place -

7th Describe in detail how they work the blue off etc -

8th Inspect the phosphorous Cup note average of those Cups - which are gummed over on top of phos - of different amount etc.

9th = State of phosphorus in the mechanical dryer - also if fine flakes phos are liable to be carried up into bulb -

10th - Note if they try to run a pump too long -

11th - Note if the Volts used in pump room vary much -

12th Note in room where Carbons are inspected or put on wires how they handle them if no injury is done.

13th - Note if the temperature of Baking oven when Lamps are heated before putting on pumps of temperature is greater than necessary to slightly brown paper -

100
60
35 20, 600 — 14,76
20 44 369 — 8,67
11 77 217 — 5 07
6,70 126 — 2,88
3,82 ,30 — 1,06,
2 76 — 76
200 30
160 15
100 9845
80 130 4
50 4
30 2
146,89
23.1

146 —

60 lbs —

50
80
4000

40,
24.80

14 -

Take 20 Lamps each day just as they come bring them to dull red in dark room and record spots - devise a system of your own to give the degree of spotting =

15th - See that in Sealing in machine flame does not strike filament & also of any injury from handling -

16th see if ~~bb~~ bulbs are generally clean before sealing in -

17 Report defects in clamping material & all other defects of whole output. The factory

60 = c delivered

122 40
24
16
8
3
2,50

12 50c

$2\frac{1}{2}$ time

80
30
22
5
5
142
84
226
35
Total 261 Wages

1
15

1728

835

1200
3
3600
24
14400
7200
86400

3.8
3
114
11
125

4 days

15

has this I believe and they
can give you a copy

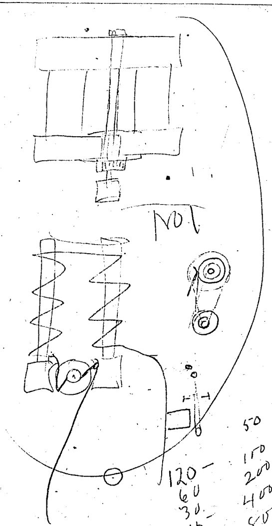
Make your report
Wednesday and Saturday
Each week to me

5000) 60000 (12
5000
10,000

48
70
25
15
16
7 oil used
171
150

12c

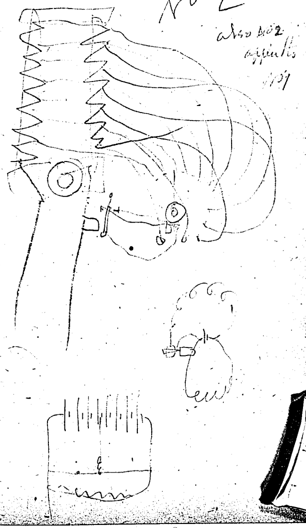
wages	266
Coal	125
wood	5
oil	15
Rollerman	40
Screenman	6
Coal for Drys	50
general man	25
Belts	10
	542
	3

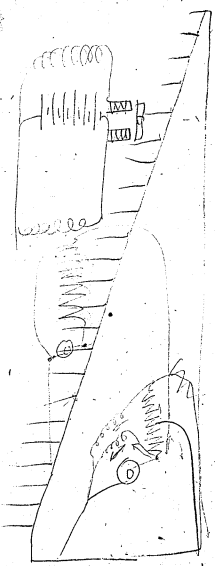


120 — 50
60 150
30 200
15 400
7 800
3 1600

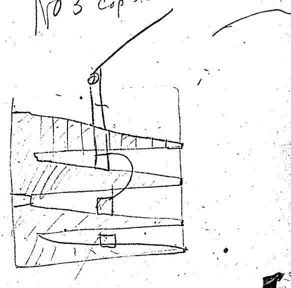
No 2

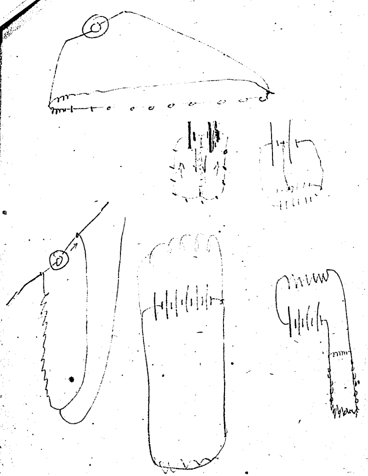
also No 2
appendix
1/09





Short ckt series wound
Copper sheath -
also thrown in Res
No 3 Cop sheath Shunt wound





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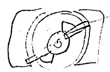


Iron
axle shaft

No 5

increase in torque
moves lever to
move brushes so
Res for feed—

3.82
35
1910
1146
133.70

670
288
3,82

1177
507
6,70

6.70
35
3350
2010
234.50

126
360
80
2,88.00

1177
35
5885
3531
411.95

217
628
80
5,024.0

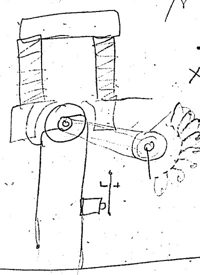
382
106
2.76

2.76
35
1380
828
96.60

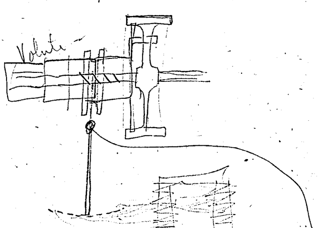
628
502
1.26

1.33
80
106.40

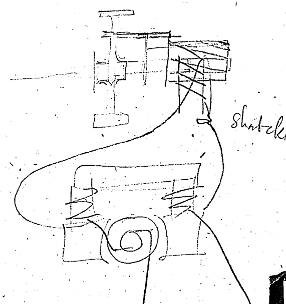
.96
80
.768.0



No 7



No 8



2044
867
11,77

35 20
35

10 –

60 00
24 80
35,20

50
80
4000

2044
35
10220
6132
71540

50

60
35
300
180
21.00

35
35
175
105
1225
80
0

369
1909

3520
1476
2044

21
10
31
80
2480

31 00
24 80
6,20

12 25
6 20
18 45
80
1476 00

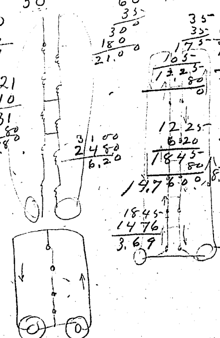
715
369
1084
80
86720

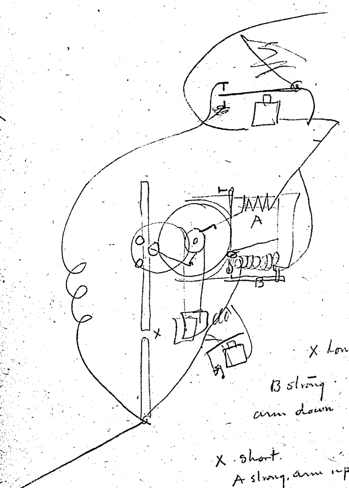
1845
1476
369

1084
867
217

9 inches

9 inches





X long

B strong arm down

X short.
A strong, arm up

Current off:

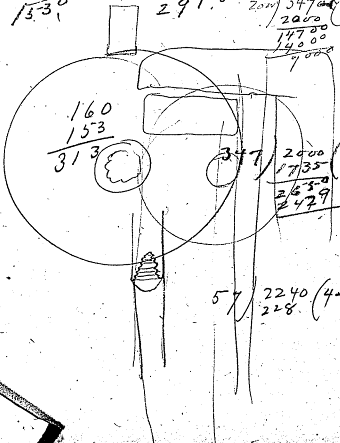
347

34.7
4
138.8
153.0
291.8

255
6
153.0

200) 347.00 (1.7
200
1470
1400
700

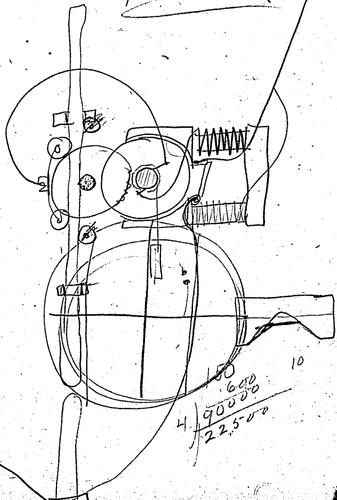
160
153
313



347) 2000 (57
1735
2650
2429

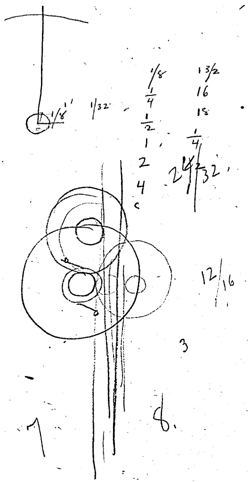
57) 2240 (4
228

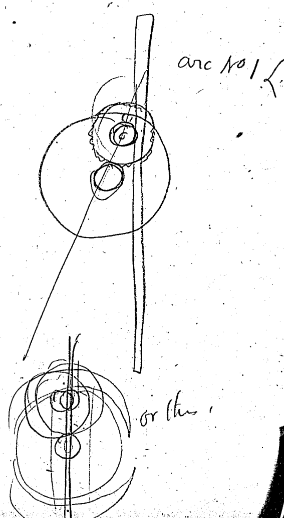
No 1 Arc. Lamp

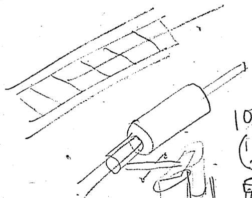


10

150
600
4) 9000
2250


12/16
3
8.


arc No 1
or this

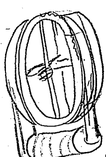


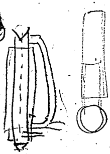
100 vols CO-
130 vols CO_2
-70 — CO-

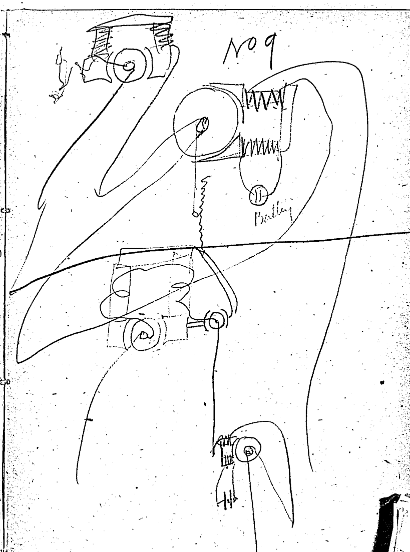
170
60
130 CO

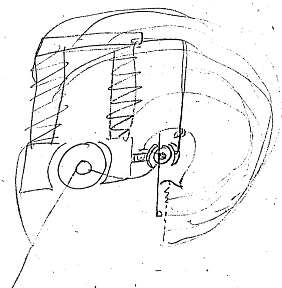
30 CO_2 100 CO
60 CO 100

160.

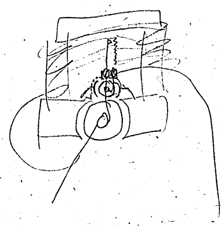








No 10 -.



No 11

1st. The Ether is What we call Magnetism
Condensation or a stress in Ether" simply manifested by increased magnetism —

Electricity is produced in any arrangement ~~which~~ which can conduct and return an impulse to its place of origination by a condensation or diminution of the orbit of the molecule or displacement from one position to another position of the molecules where any condensation or rarefaction takes place =

in a thermo ~~two~~ heat travelling Expands the distances of the molecules when these reach the metal where there is a change in temperature by is poorer conductivity for heat. the distance between the molecules will suddenly diminish & this will produce a molecular wave throughout the Circuit & produce what we call Electricity as with Sound waves in a wire

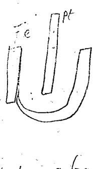
with a battery. the effect is to ~~produce a rar~~ say decompose water a wave is produced by rarefaction of O from H. + a condensation by Combination of O with Zn + H with O of say Cupric oxide —

~~When hence there is a lost~~

In passing a wire between a magnet. there is a rarefaction & condensation of the molecules by the stress acting on the molecules, these stress lines of which there are billions in a Centimetre enter between the molecules in vast of which there are also billions producing condensations at one point & rarefaction at others,

Magnetic Lines or Ether pervade all space but around the Earth there are Condensations & thus we have the Magnetic Lines of the Earth.

If a Carbon disk ~~is~~ brought to a white heat in a non oxdz atmosphere and a large wheel of silver run on its periphery the same being hollow & Cooled with water — there will be a current generated when (rotated) ~~Equal to the difference amount in the~~ by reason of the sudden Condensation of the Expanded Molecule when it makes Contact with the Cold silver this Condensation will produce a wave



Perhaps a battery is after all only a thermo — the Thermic action of decomposition taking place at the surface of the positive Metal heat the juncture for say a billionth of a second hence no penetration of heat in the Electrode + a condensation by cooling —

~~the temperature of each construction locally reading~~

20°

1300
20
26000

150 —

1300
47
9100
5200
61100

56 —

10

4.6

21

1300
70
91000

28
16
1
45
75
25
145
150
195

56)200(
168
320
336

260
300
78000

600
300
180000

3.6

46
66
276

36 276
66 303 6
21 6
216
23.7
40
(277

303
230
73

150
80
23

277
230
47

70)5000(71
490
100

71
70
7

150
80
230

23 —

12% —
21 units
~~75~~ no profit to C

71
3
213 —

21 —

2

22

$$11 \overline{)140} (12.72$$

8.75
16
5250
875
140.00

140
12 72
12 72

$$16 \overline{)165.44} (10.34$$

14

1272
2

$$16 \overline{)25.44} (1.59$$

12.72 oz per Rev

140 oz 8.75 lbs started

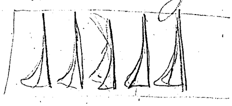
13 Rev would be 165.4 oz or

10.35 lbs increasing temp of hot blast stove should tend to raise the pressure ~~of wet more than~~ The Briquette just supplied the Opening power of the Coke & Limestone taken off & extra Slag formed — & the raising of blast from 1000 to 1100 @ 1200 later —

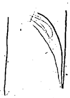
Each Rev of Eng made 25 Tons Extra, 2 Rev 50 — 15 Rev should make 200 Tons

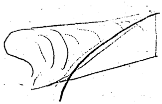
+ increase pressure 1.59 lbs

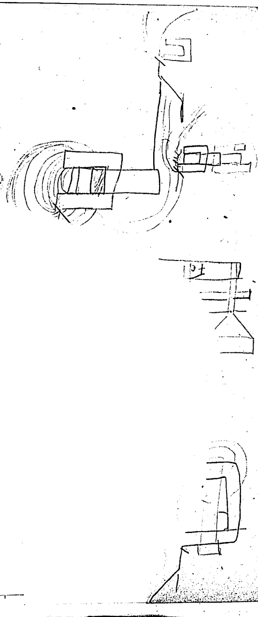
(i.e.) from 1035 to 1194 say
12 lbs - with gas to 1300

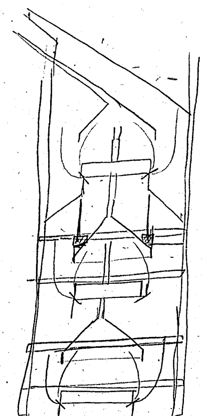


1035
159
1194









300 — 75 — 149 — tons

225
151 — 38 m — 90 —
61 — 13 m — 34 — 8
26 — 7 m — 16
10 — 4 — 6
4 — 3
2
1 — 1
480 — 1
2

480 ←

120
4
480

130 — 70 hp
3
90

75 70 5.0 — 35 70 2.45

130
35
650
390
4550

245
170
415

5
3
8

26
16
10

26
50
1300
7
20
80
1600

225
50
112.50

157
50
75.50
3800
113.50
80
90.40

112
75
187
80
1496

187
149
38

151
90
61

300
149
151

30.50
13.50
43.5
80
34.800

6100
348
26.2

300
350
300
1300
600
600
250
3700

174
2
350

3700
400
296

10
17
27

34
70
2380
70

3.4 | 60 (1.86
34
260
238
220

190

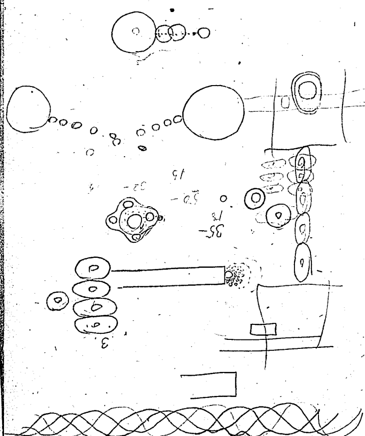
1.9
8
16.3
50.0
66.5

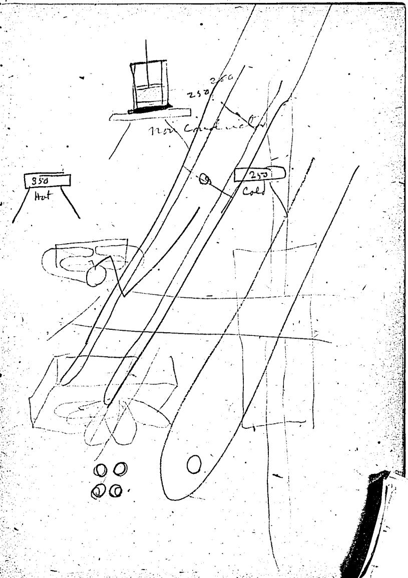
665 | 2280 (3.4
108
120
1995
2860
2060

665
3
1995
266
2261

2660

3.4


35


250
300
Non Conductor
350
Hot
250
Cold

Iron Atomic weight 56.
Equivalent ~~28~~ Fe = 28 Ferrosum -
fe = 18 2/3 - Ferricum
All iron contains Carbon -

Pure iron - extremely tenacious softer than ordinary malleable iron - presenting a scaley conchoidal, or sometimes Crystaline fracture, Specific gravity after melting → 7.8439 - in sheet or wire 7.75 to 7.60 -

Iron by Electrolysis Spec gravity 8.1393
Scarcely acted on by acids at ordinary temperature
but by heat Evolves H without the peculiar smell.

Crystalized form Either the Cube, Octohedron, or some other form belonging to the Regular System -

Specific Heat of ordinary malleable iron 0.113795
somewhat higher when amount Carbon is larger - (Regnault)

Conducting power for heat gold being say 1000 is 374.3
Despretz

Linear & Cubical Expansion is less than most metals -
Linear Ex for each deg between 100 & 300 C = $\frac{1}{68100}$ (D & Petit)

An iron bar Expands $\frac{3}{560}$ when raised from a red heat to white heat
& $\frac{7}{560}$ when heated from 20 C to whiteness. (Rinman)

Melting p not certainly determined 1550 C by Pouillet, 2000 C by Scheerer

Electric Conductivity –
Cu 100 then Fe 20 (Hansen)
15.8 (Becquerel) — 17.74 Lenz –

~~Plate iron at 0 C~~ 91.8
72.8
84.6 } Matthiessen

~~Electrolytic Iron~~
~~at 0. C. 100.~~

	Conductivity at 0.C	% of decrement in Conductivity bet 0 C & 100 C	Deduced Conductivity of pure Fe at 0 C
Electrolytic Fe	100	38.3	102.7
Plate Fe	91.8	36.0	102.1
	72.8	34.1	
	84.6	34.7	99.2

Matthiessen.

up to temp of 146 C Boiler plate tenacity not perceptibly diminished at red heat reduced 1/4th –

tenacity of good rivet iron at 190 C is 1/3 greater than at ordinary temp but at red heat reduced nearly one half –

Malleability increases with temperature White heat it is pasty its plastic + kneadable far below its melting point.

Combines with O when heated to 230 C in air

Decomp H_2O at 360 C

Burns at white heat.

Swedish iron

	No 1	2	3
Iron	99.863	99.220	99.544
Carbon	0.054	0.087	0.087
Silicon	0.025	0.056	0.115
Sulphur	0.055	0.632	0.220
Phos	Trace	0.005	0.034

Only iron free from C is called burnt iron — this cant be welded, but some say this is because of oxide getting in

Sulphur makes Fe Red short
Phos " " Cold short
Si " " Rotten
Cu " " Red short
(reduces its capability being welded)
Mangan " " Harder but not steely

Linear Exp of Cast iron

$\frac{7}{560}$ bet 20 & 560 C (Red heat) -
& $\frac{12}{560}$ bet 20 & white heat (Rinman)

Cast Fe increases in bulk when cooled from Liquid -
pieces C, Fe thrown into fluid Cast iron sink but when near MP floats

The greatest amount of Expansion or Contraction takes place just below the melting point in Cast iron

on account of a Contraction near MP its necessary make mould for castings proportionally larger than Castings are required to be

Contraction grey C Fe 1 pct.
White from 2 to 2.5 of linear dimension

Cast Fe undergoes permanent increase bulk under long continued heat at elevated temp grey Cast Fe oxidizes sooner than Malleable Fe.

White Cast dissolved in Conc HCl not Entirely dissolved – grey C Fe leaves residue of graphite – in both cases Combined C Enters into Combin with the nascent Hydrogen forming Volatile Hydrocbns.

a dilu [illegible] HCl –

White CI – bulky, dark Brown residue sol in KO, readily Combustible, leaves black residue Containing Silica.

grey CI – Residue part graphite partly of Carbonaceous Sub as in White CI + some black Carbonaceous stuff which is magnetic takes fire in air & leaves Ferric oxide –

grey Fe 2. @ 4.65 C
White 3.5 @ 5.75 Carbn

Magnetic pyrites.

Slightly magnetic – sp gravity 4.15 @ 4.7 occurs Crystalline Compact or granular 60.49 – Iron – 39.51 Sulphur

Arsenical pyrites – Calcopyrites
other Iron & Ni Co pyrites get formulas.

Alloys

3 pts Bismuth 1 Fe still magnetic

Lead – 96.7 Fe 3.24 Pb – magnetic

Manganese 22% of it renders Fe non magnetic

Molybdenum Equal parts; magnetic Bluish grey Brittle, fine grained

$FeBr_2$ Fe_2Br_6 –

$FeCl_2$ Fe_2Cl_6 –
FeI_2 Fe_2I_6

Fixed alkalis precip iron from salts as White Hydrate.

Fe forms 2 oxides
Proto FeO + Sesqui or ferric Fe_2O_3
[illegible] which [illegible]

The intermediate Oxide [illegible] between proto & sesqui is magnetic [illegible] ore –

Octoferric Sulphide Fe_8S_9 magnetic
Hemisulphide Fe_2S "
proto, FeS nonmag
Sesquisulph Fe_2S_3 | nonmag
Ferroso-ferric Sulphide – magnetic pyrites

Disulphide Fe FeS_2 non magnetic

action cold on iron
Cold bars appeared crystalline on fracture
Warm bars " " fibrous
all this has been denied – but proof given by RR records

See Barrett: Phil Mag $\boxed{4}$ XLvii 51.
also $\boxed{4}$ XLvi 478 –

Hankel (ann phy chem 2 – i 285 –

Rowland phil Mag (4) XLvi 10
XLviii 321.

~~A~~ L Holz – Poggendf – Cli / 69 –
Cliv 67

Ann phy – Erganzbd – viii 353.
Gahresb f Chem 1877 171 –

40 m

300 - ~~180~~ 168

180

132 . ~~20~~ m 69

63 - 12 m 34

29 - 5 m 16 -

13 - ~~3~~ 7

6

3

2

1

429

22315
12
43
344
86
68
1

132
69
63

429

132
66
86
300
168
132

13
6
9
7

29
145
195
1560
9000

120
90
210
168

210
168
42

70
3
210

40 kg

400

130
3
390

29
16
13

L Kalp - pog Anal. 320 CLV

Trève & Duravier Compt R. LXXX 799
LXXXI 1123 - 1246 -
Gamier ibid LXXXI 1126.

Beelz pog Anal CLII 484

Gangain - Compt Rend LXXXII 149
& LXXX 247 - LXXXII 685 1422

Gamier Compt R LXXVII 89 -

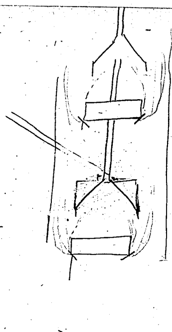
Favé - " " LXXXII 276

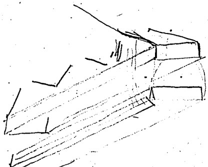
Daubree " " LXXXII 279
& LXXX 526.

Gangain Compt R LXXXIII 661 896
LXXXV 219

Tommasi - C Rendus LXXX 1007.

Maumé " same - p. 1138





Sir Wm T - Proc Roy Soc XXIII 445 473

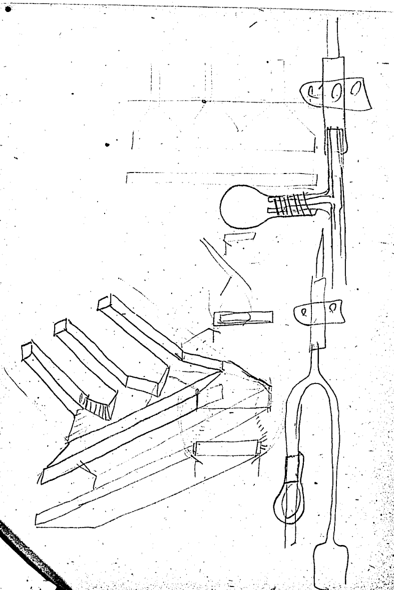
G Wiedemann Poggendorf
CXXVI 1 CXXXV 177
J pr chem (2) IX 145 — Phil Mag
(4) XXX 366 XXXVII 314 —
(5) — IV 161 276 —

TL Phipson Bull Soc Chim (2) VII 322
Chem News XXXII 162

Maxwell's Theory

Magneto Electric phenomenon due to
existence matter under certain
Conditions of motion or of pressure in
Every part of the magnetic field — The substance
producing these Effects may be a certain
part of ordinary matter or it may be
any Ether associated with matter

over

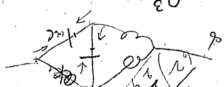


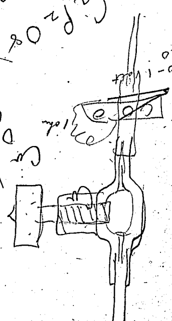
2 = Conditions of any part of the field
through which lines of magnetic force
pass is one of unequal pressure in
different directions, pressure being least
along lines force so that they may be
considered lines of tension —

3 This inequality of pressure is due to
Vortices Coaxial with the lines of
force — The density of revolving
matter is proportional to the
Magnetic permeability of the medium
The direction of rotation is related to
the direction of the line of force
& the velocity of the circumference
of the Vortex is proportional to the
resultant magnetic force —

4th The Vortices are separated from each other by a single layer of round particles so that a system of cells is formed The partitions being layers of these particles & the substance of each cell being capable of rotating as a vortex —

5th particles forming the layer are in rolling contact with both the Vortexs which they separate but do not rub against each other. They are perfectly free to roll between the Vortices & so to change their place — provided they keep within one complete molecule of the substance but in passing from one molecule to the other they experience resistance & generate irregular motion which constitute heat.





8000 — 1 deg C.

1 grm C heat 8000 grms H_2O 1 c

sp Fe_2O_3 - .15

1 grm C heat 48000 grms Iron ore, 1

1 grm C heat. 48 - grms Iron ore 1000. C

2

6

15) 100 (6 -
90

90 —

48000

1 ton 48000 — 27000 1 deg

20 200

67.4

3.

70.4. 50

250

1000
32
968
5
4840

9) 48.40

200) 48000 (240
400
800
48000

These particles play the part of Electricity. Their motion of ~~translation~~ Constitutes an Electric Current, Their rotation serves to transmit the motion of the Vortices from one part of the field to the other. The tangential pressure thus brot into play Constitutes E.M.F. & the [illegible] [illegible] of the Conjoining particles Constitute Electric displacement.

1030
9
5) 18270
3654

5000
32
9) 4968
552.
11

1000
9
5) 9082

212
32
180
5
900

212
5
1060
32
1028

9000

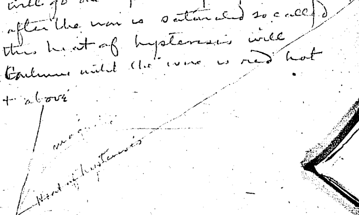
212
32

(Theory Z - Edison)

production of E is a molecular disturbance - a forced disturbance of molecular architecture, Its never a Continuous disturbance but momentarily, all such disturbances produce waves in the Ether of frequency comparable to Light vibrations - Sound Vibtns are Enmasse, not molecular -

If molecular disturbances are made near a Conductor, the only reason that the wave proceeds along a Conductor is due to the molecular hysteresis of such Conductor producing a lag between the Ether in the "matter" & the Ether of the boundary.
Were there no lag telegphy would be impossible - this hysteresis produces heat, - Each wave produces a moving of the Molecules & a return ~~the~~ & internal friction gives the heat.
The same holds good for now
The phenomena of Magnetism is only

a question of degree special amplifying Conditions render it striking but its ~~theory~~ only an incidental phenomenon
hysteresis & heat due to reversals in or will go on up to any degree long after the iron is saturated so called this heat of hysteresis will Continue until the wire is red hot & above



There are no whirls of the Ether around a Copper wire -
The wave is like a wire put in the Center of a phono funnel. it goes forward along the wire & not into space as with sound by reason of the lag in the Ether in the wire

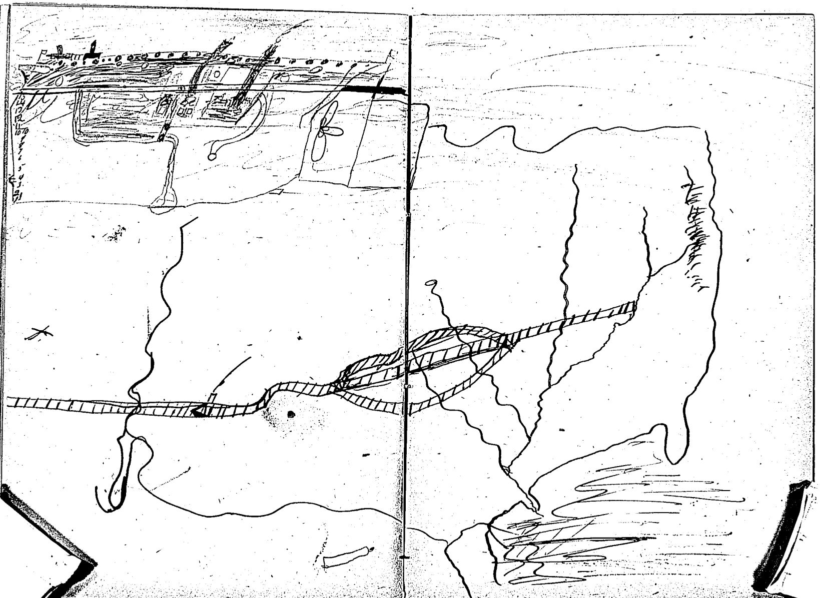
due to necessity of work being
done in disturbing the molecular
structure,

Copper molecules return to zero
at each wave while iron
does owing to its crystalline formation & its successive impulses
work its molecular structure
more & more to a strained condition
until a permanent state is reached
depending on the waves when no
further deformation of the structure
takes place — when this condition
is reached in hard steel, it
is ~~per~~ permanent distortion of
the normal condition of matter
in connection with the Ether
The 2 form a fixed static system
in which nothing moves —
The passage of a wave through this
fixed system in air simply serves
to disturb the molecular condition
of the wire + produce waves

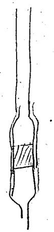
which pass over the wire by the
loss due to hysteresis work in the wire.

were the internal molecular friction
in copper as great as in iron we
should have magnetism

The resistance of Copper
and Zinc is the same, but the
work done in the Zinc by hysteresis
is greater, there is a greater drop of Energy
hence we say it has more resistance
the difference in the friction is measured
by keeping Zinc at 30 & raising
the [illegible] of Cu until both before
the wire apparent KR then the
heat added to Cu represents the
internal friction of the Zinc —



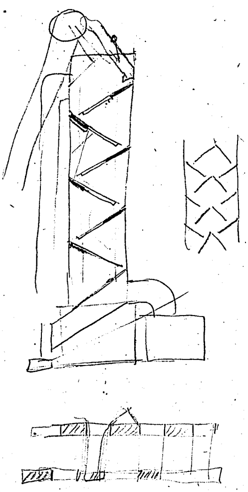
373
15
1865
373
5595
24

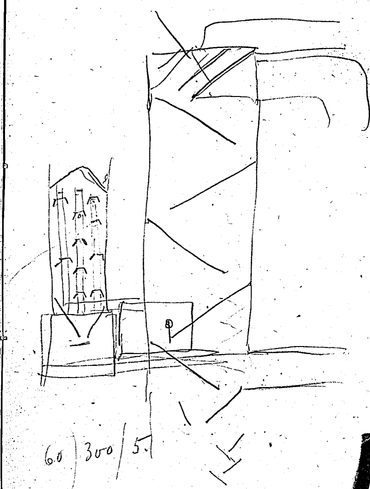


.12
.45
60
480
54

100/5.4$_0$ m amp

2/1000 ohms





60 | 300 | 5.

40) 3200 (

32) 400 (15
320
180

25

15 at 250
$7\frac{1}{2}$ at 500
3.75 1000

500
250

13
$6\frac{1}{2}$

6

8

27
5
135
13
148

3) 270
90
36

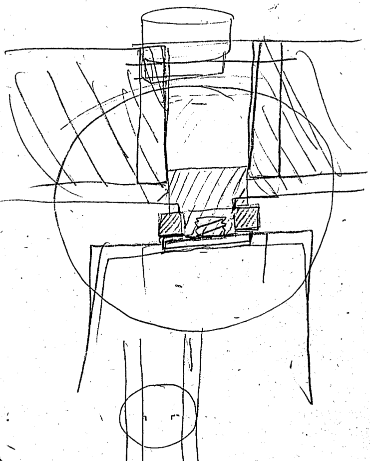
2240
270
360) 1970 ($5\frac{1}{2}$
180
17

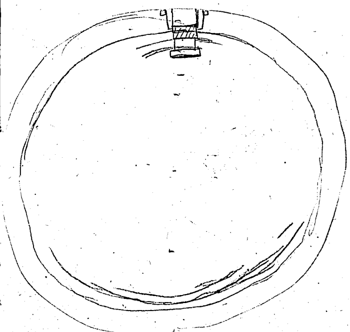
Theoretically 1 ton pure coal will raise 80 tons of iron ore to 1000 deg fahr.

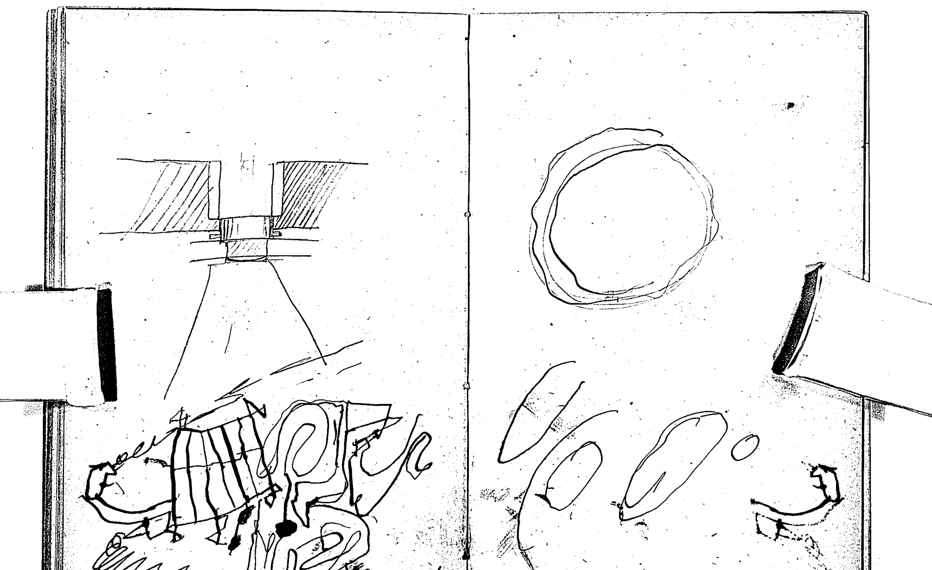
If all heat regenerated - & ejected at 200 fahr finally ~~assuming~~ 27 lbs air per ton coal burned) & spec h of air .16 then.

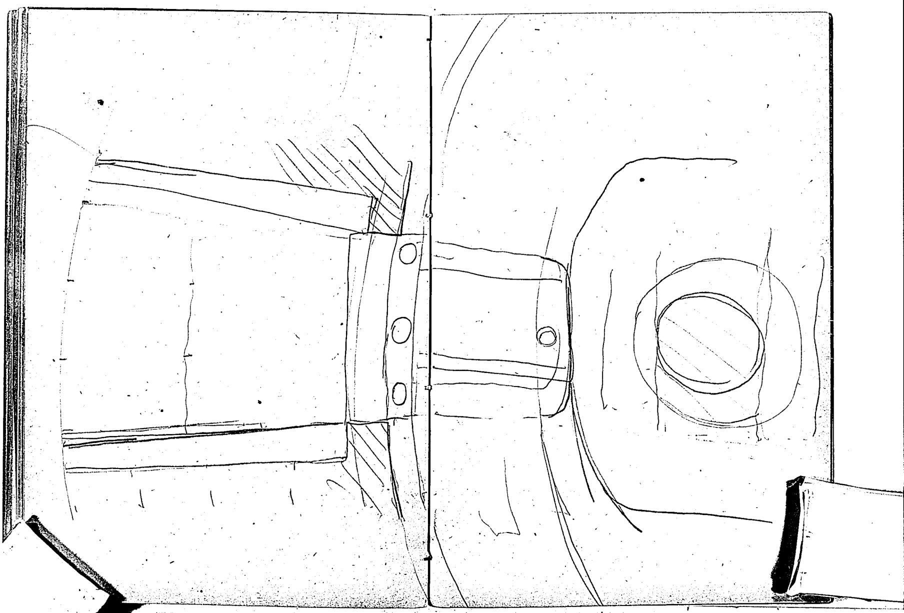
~~3.7 tons of air~~ then the 27 tons air at 200 is equivalent to equivalent to $6\frac{1}{2}$ tons ore - Reducing it from 80 tons to $73\frac{1}{2}$ =

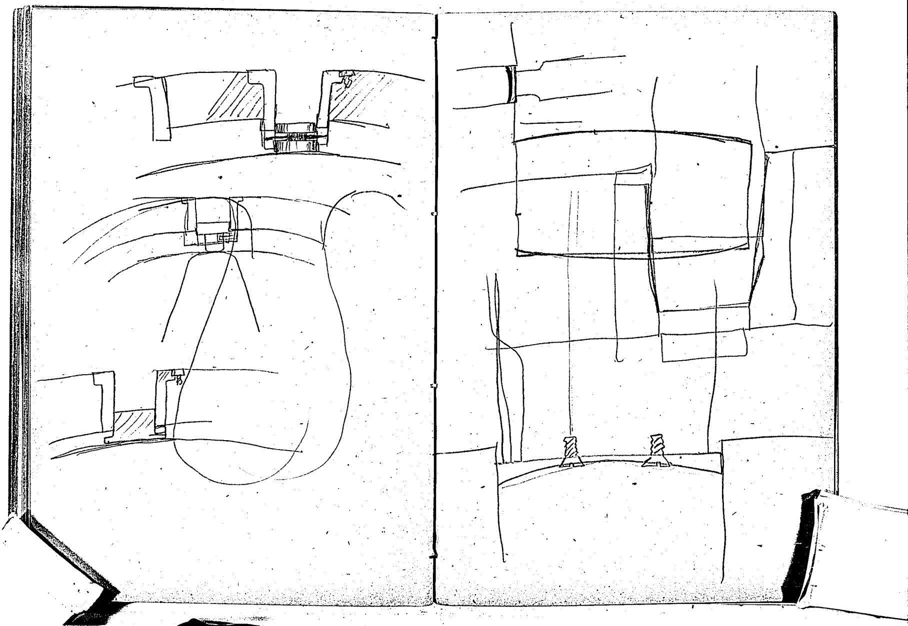
If ton coal per hour is used then 27 tons of air ejected at 200 requires 10 lbs per ton or 270 lbs. for the air ~~or~~ if we eject the ore at 300 - we can have 148 tons -



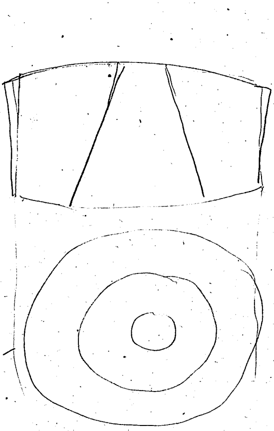




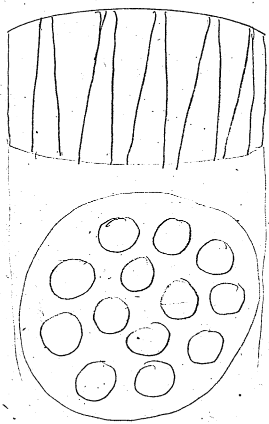


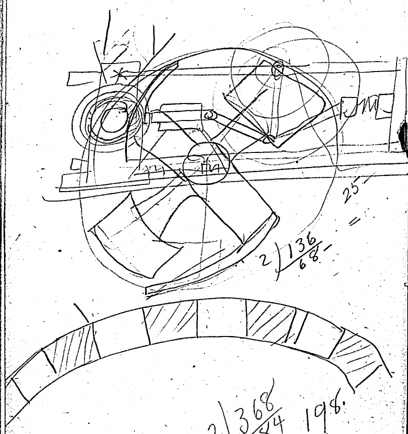


2) 3.3
1.6



65
10
3
16
94





2)136
68

25

2)368
184 198

4)49
12
80
960

4)76
19
80
15.2

4)31
8

30
80
24.0

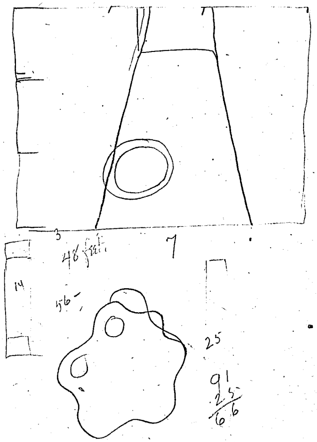
4)61
15
80
12.0

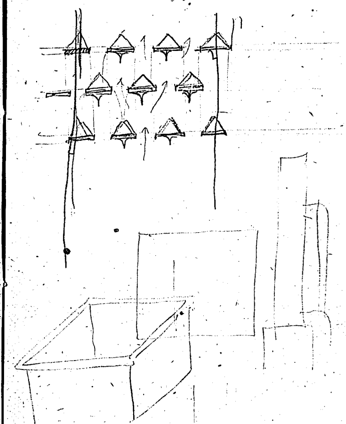
4)39
10
80
8.0

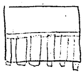
100	24
76	15
61	12
49	10
39	8
31	6.5
25	5
20	4
16	3.2
12.8	2.5
10	2
8	1.6
6.4	1
5	
4	
3	
2	
1	

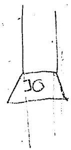
368
6

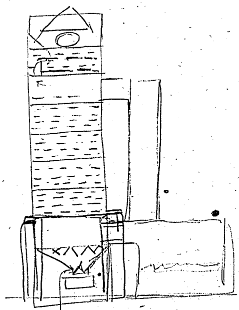
25
8
0

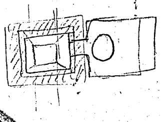

3
48 feet
7
14
56
25
91
25
66

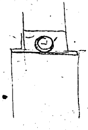


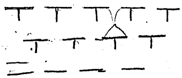


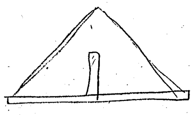


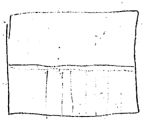


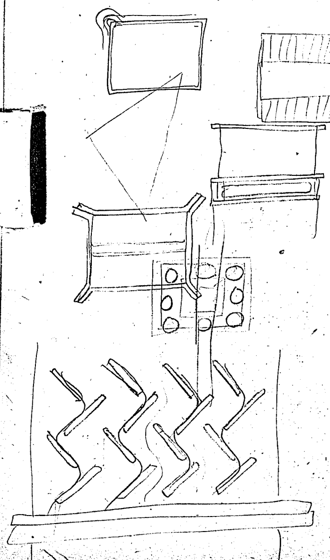
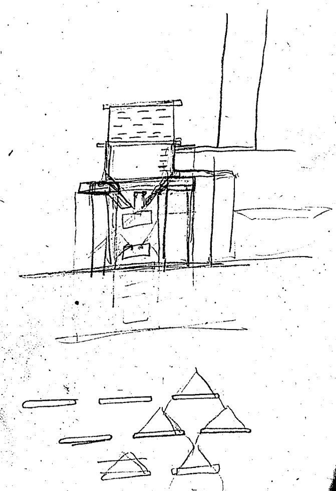


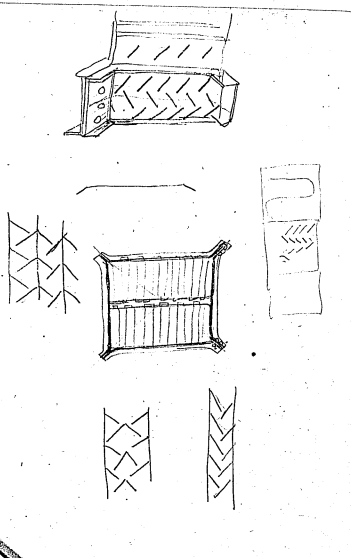


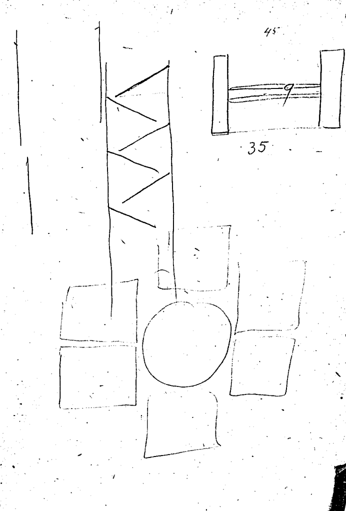






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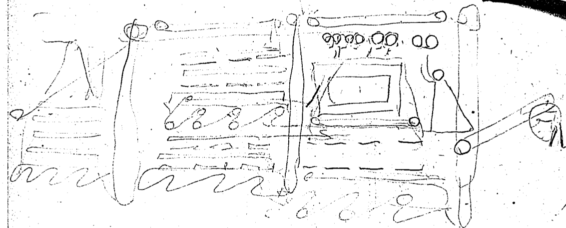
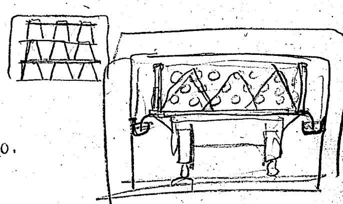
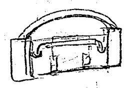
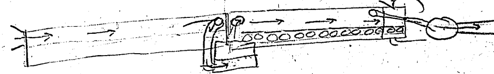




60)1200(20.



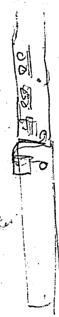


2500
300
750000
500
375000000 (25
36
15
15

25000000

40000000
20000
0000

15 ft per ton -
400
24 - 1200 | 6000 + 5 ft run
1 6 12

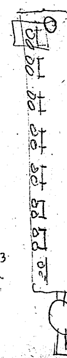


200 - 2 ton
400 4
800 8
1000 16 -

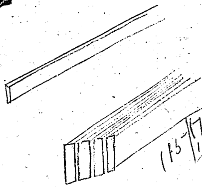
9 lbs water

2240
9
20160

200 #
800
32
24 - 1600
2400
40 tons
1225600
9 ton 4000 -
20c
7
25 tons, 80
120 | 4000 (3
36
3



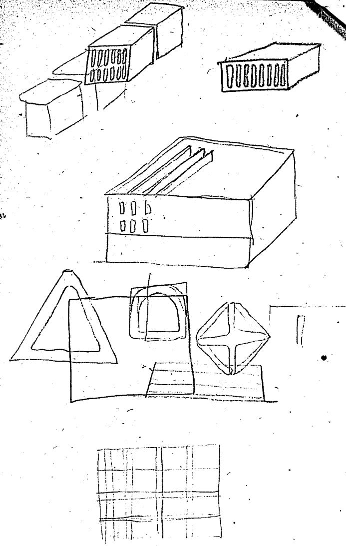
50 - 4
100 - 8
400 16
800 30 -
15 90 -



$(15$

$(15 \,|\, 120$
$15\ 0$
$5\ 7$
$4\ 5$
5

8000 dig $24 - |\,135$
8000 kw $- 144$
80
$11 \,|\, 52$ H_2O 46,000   24
ton Coal ton   2   24   2,000   24
1600   (1,200
48
24
8
9600
40 ton   1,20000
400
1600
Redhouse 290



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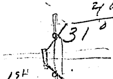

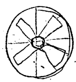

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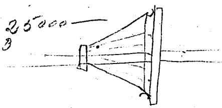

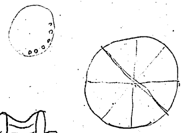

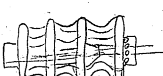

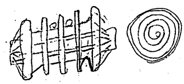

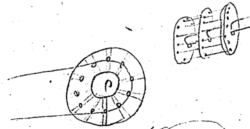

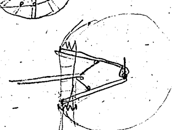

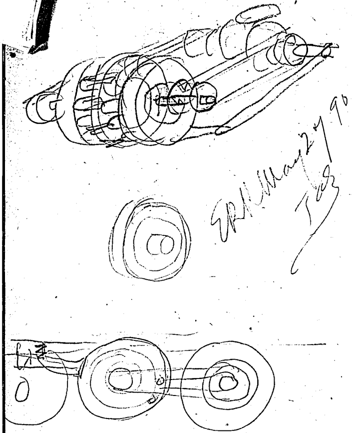

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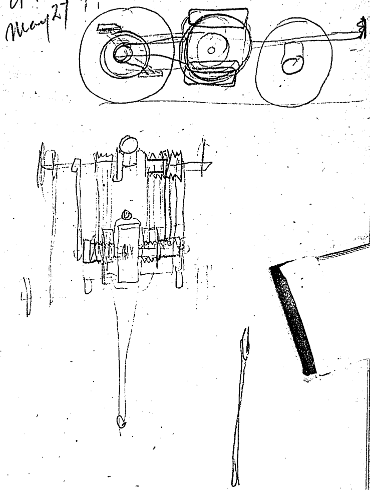

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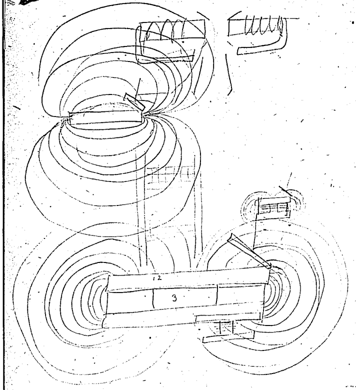

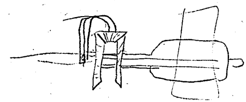

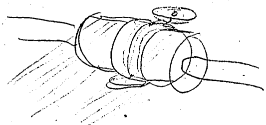

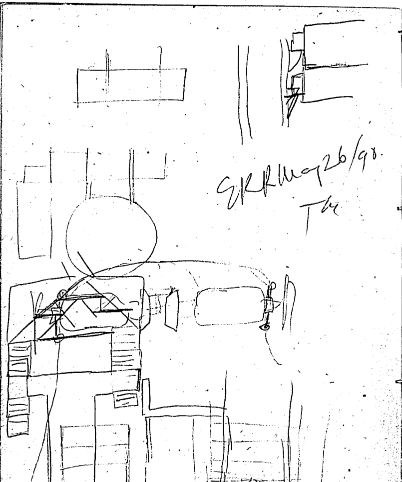

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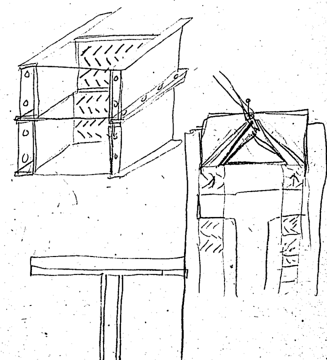

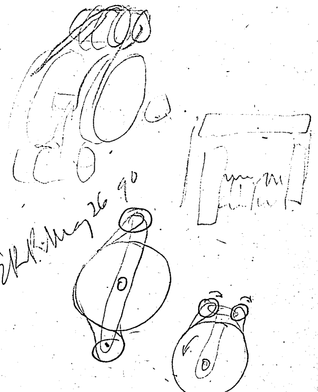

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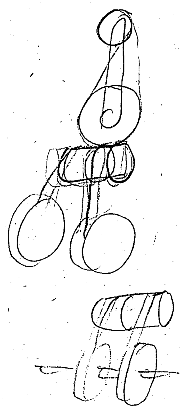

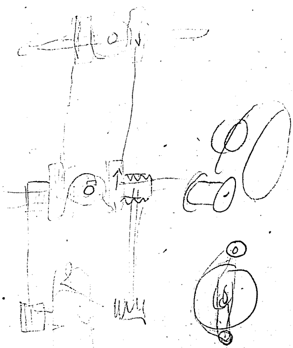

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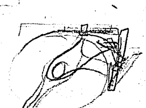

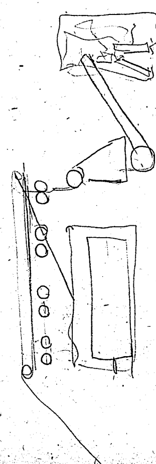

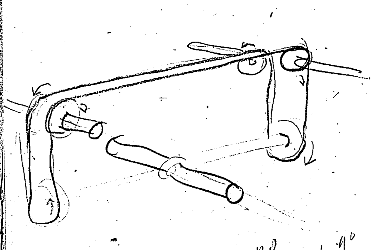

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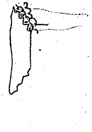

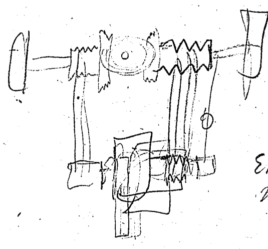

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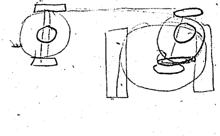

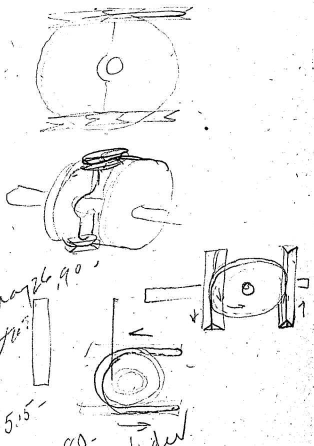

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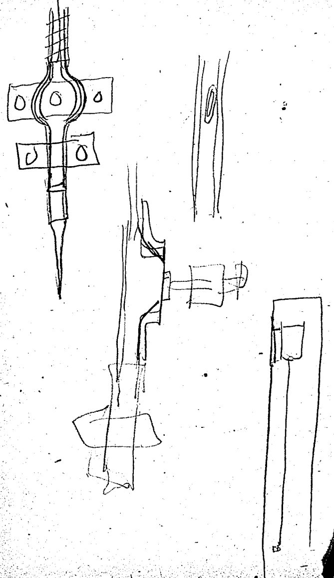

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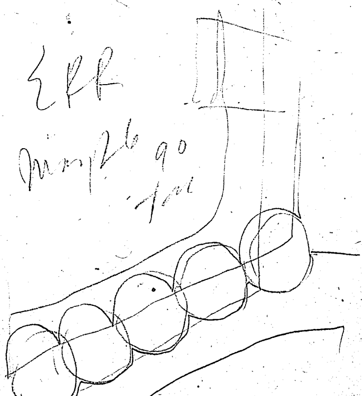

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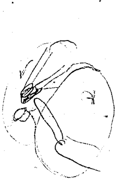

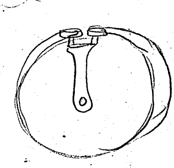

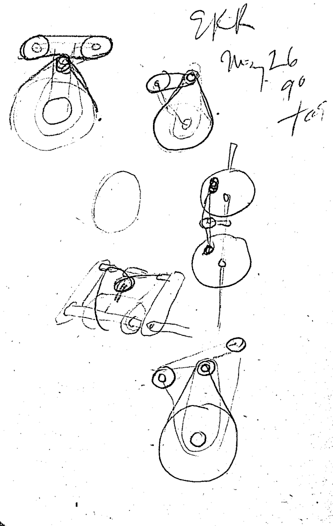
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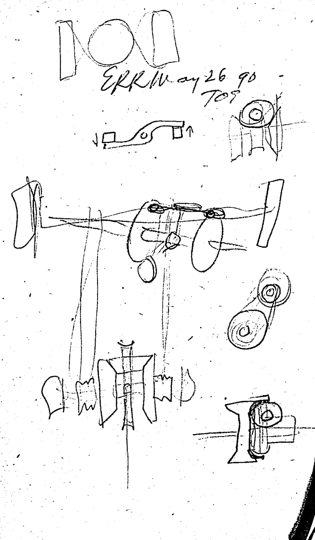
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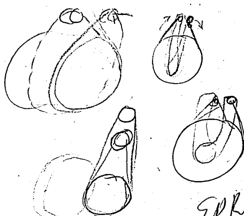

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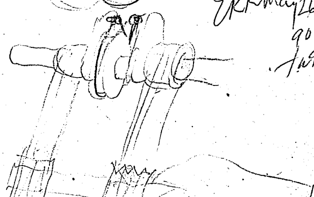

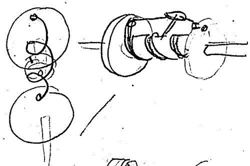

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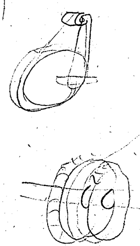

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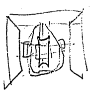

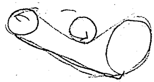

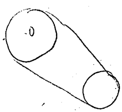

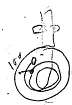

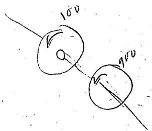

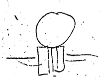

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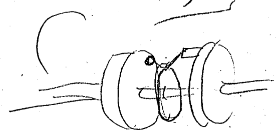

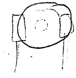

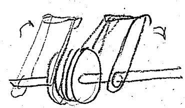

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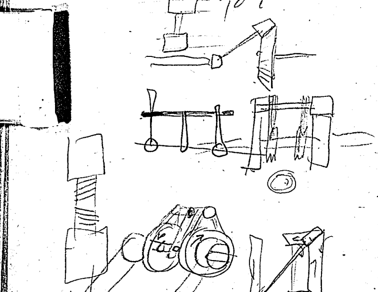

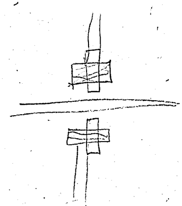

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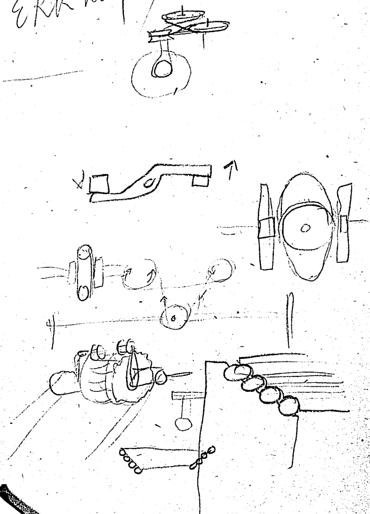

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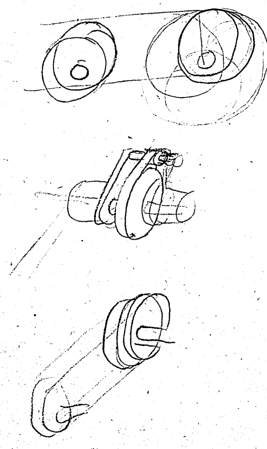
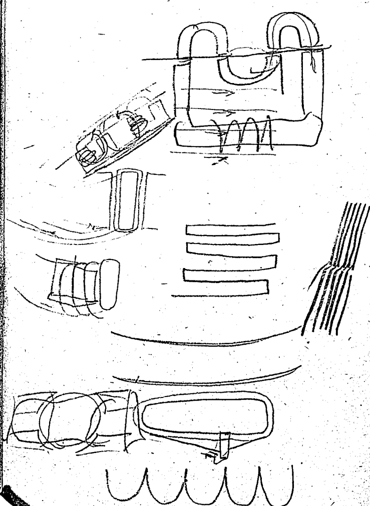
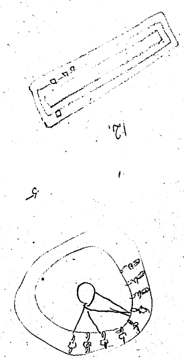




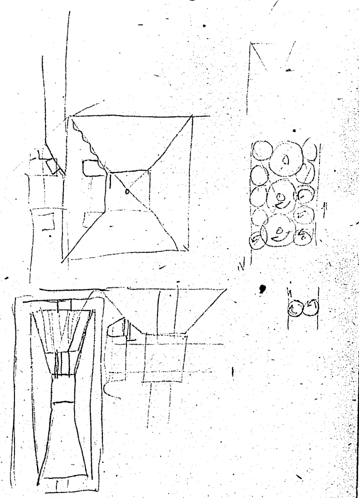


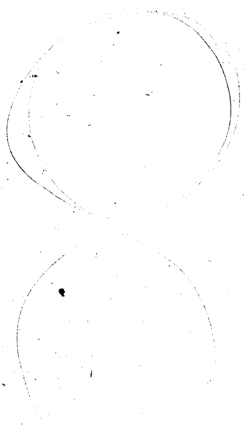
Notebook, N-90-08-03

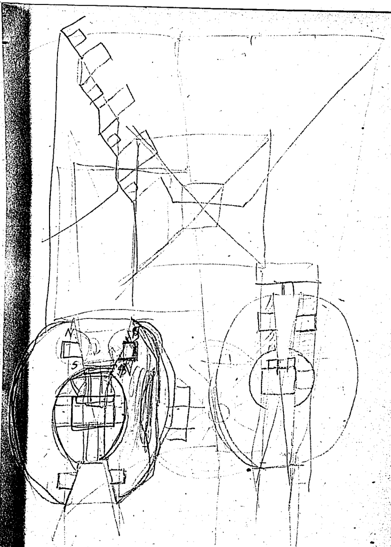
This notebook covers the period July-August 1890. All entries are by Edison. The book contains notes, drawings, and calculations relating to ore milling and electric traction. Also included are draft caveats regarding the belting and separation processes for ore milling, as well as a caveat for an alternating meter. The pages are unnumbered, and the book has been used in both directions. Several pages have been removed from both the beginning and the end of the book. Approximately 140 pages have been used.

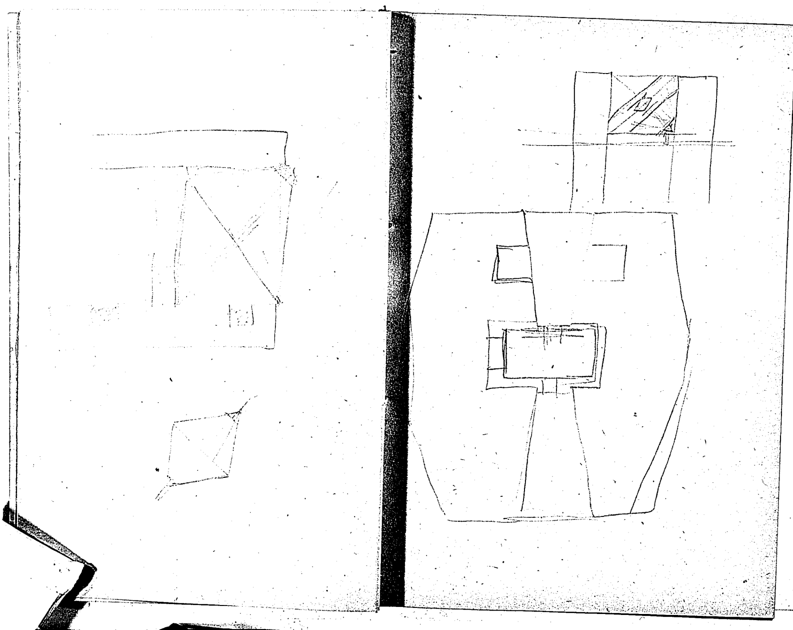
N-90-08-03

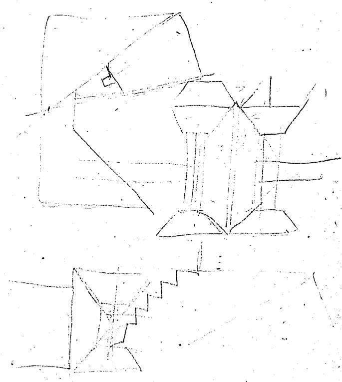
Electric RR July 23/90

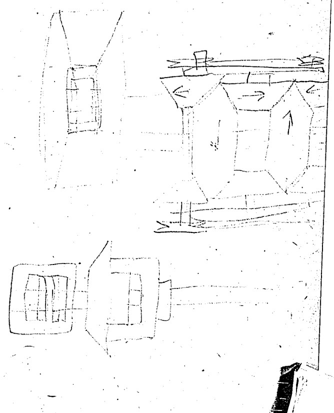


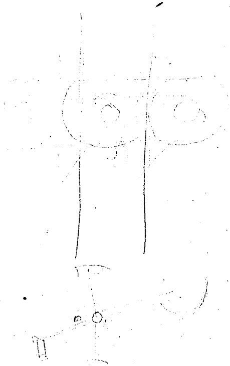


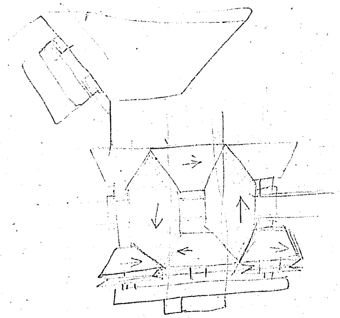


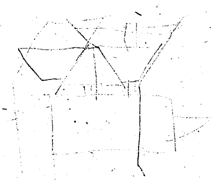


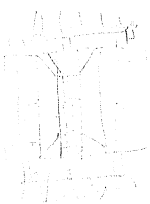


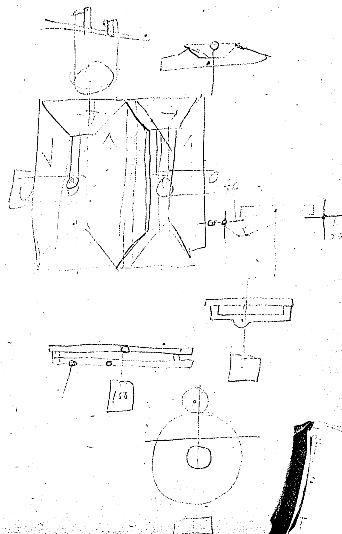








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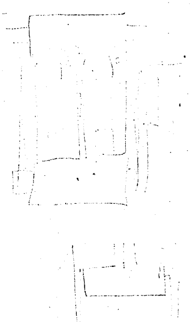

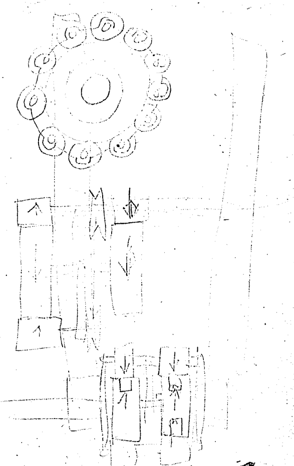

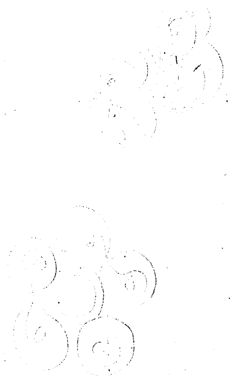

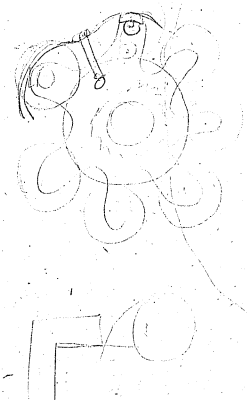

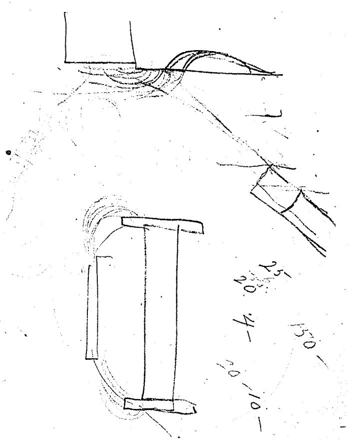
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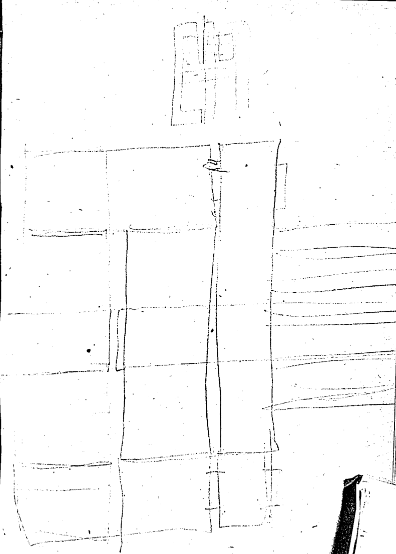

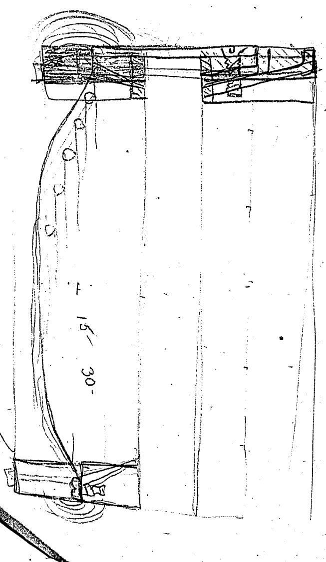
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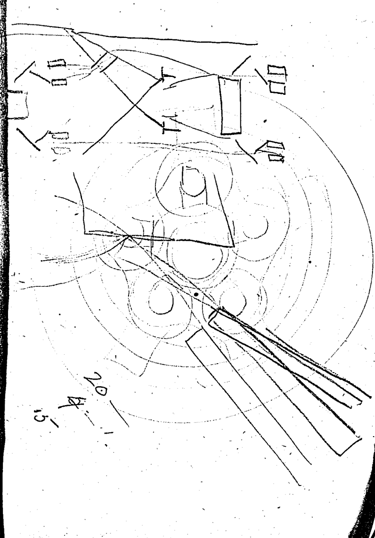
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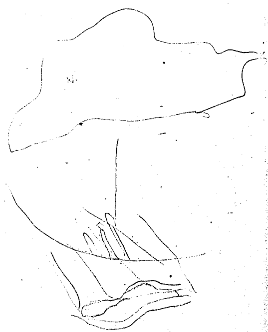

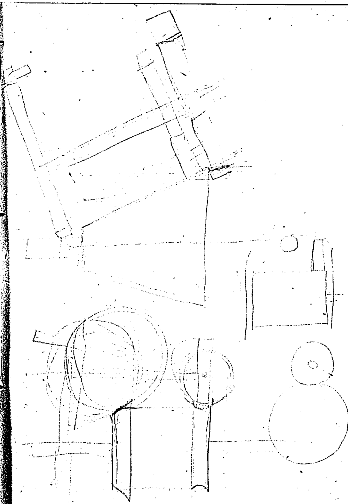

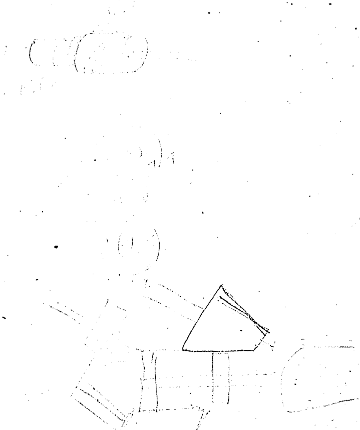

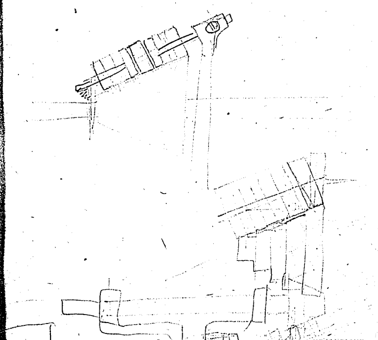

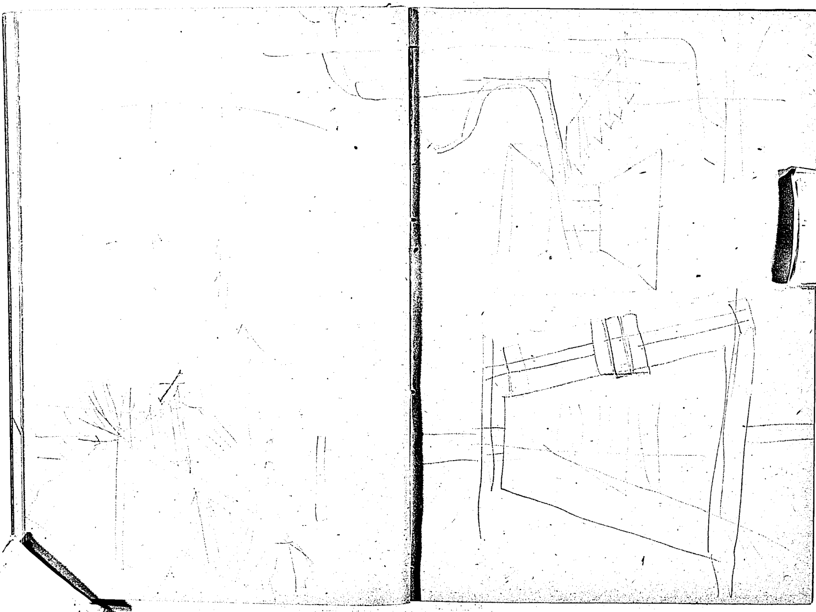

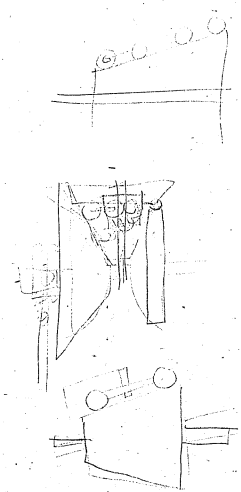

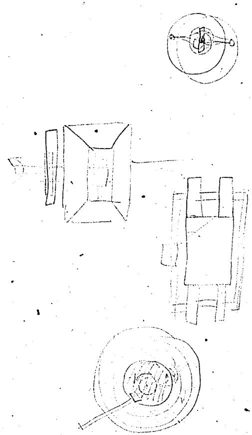

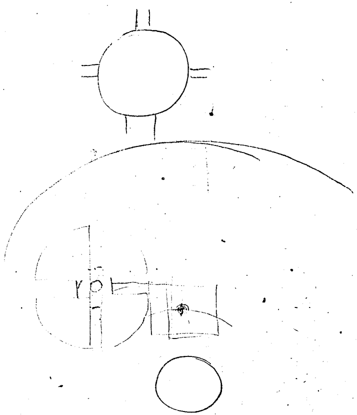

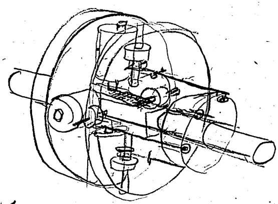

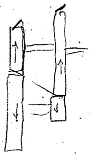

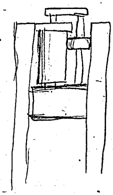

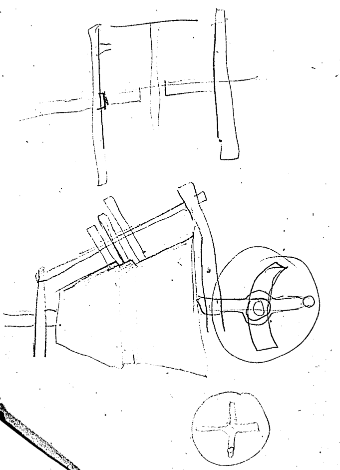

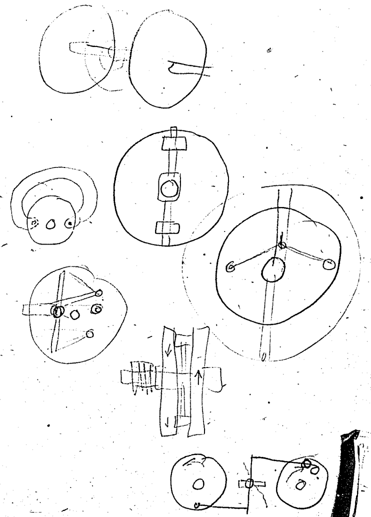

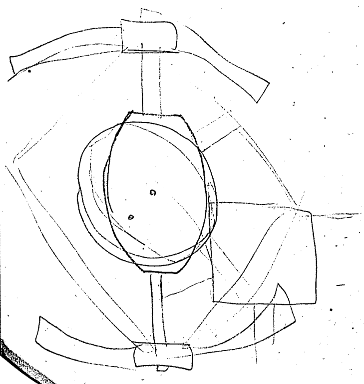

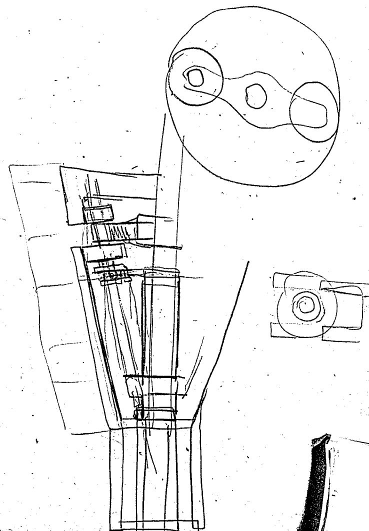

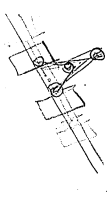

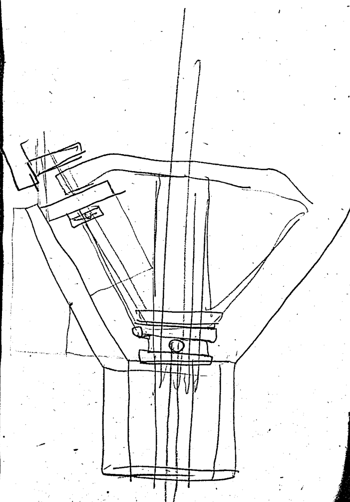

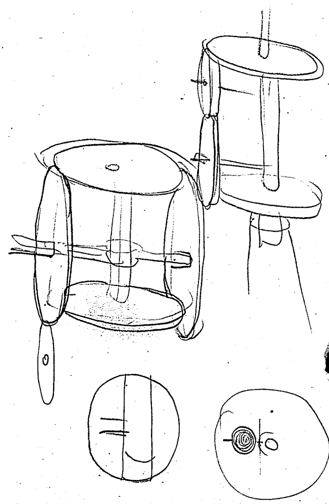

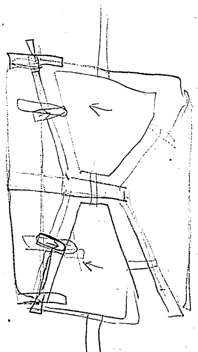

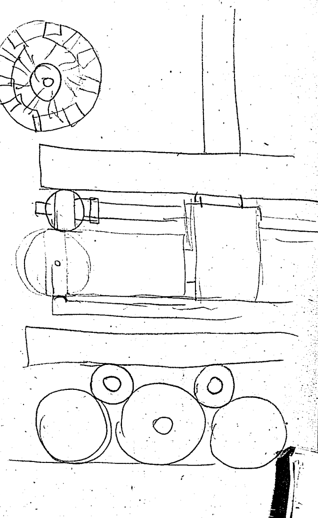

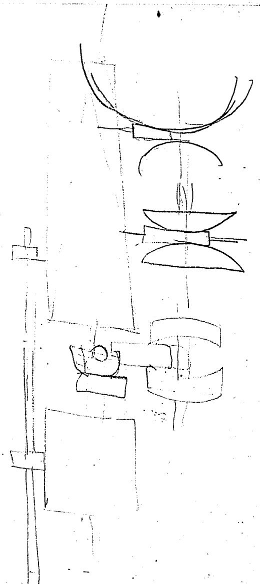

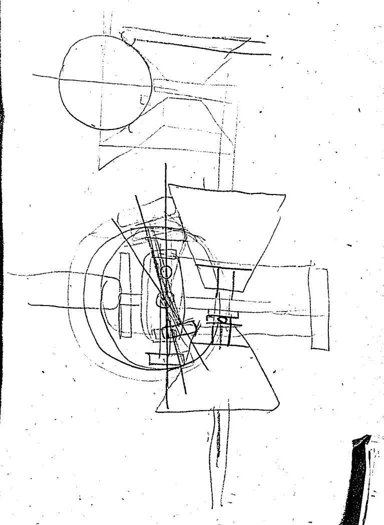

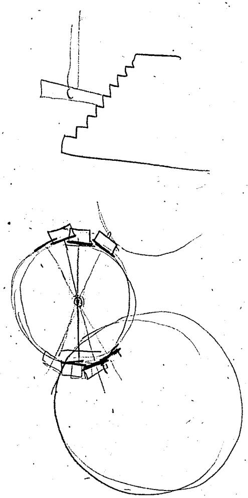

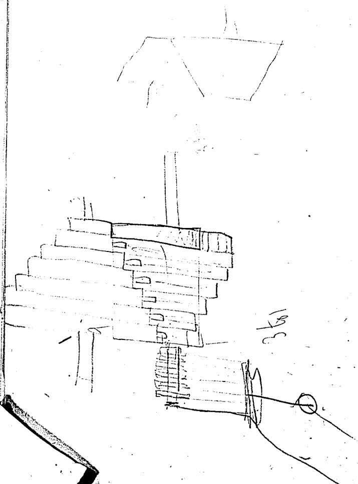

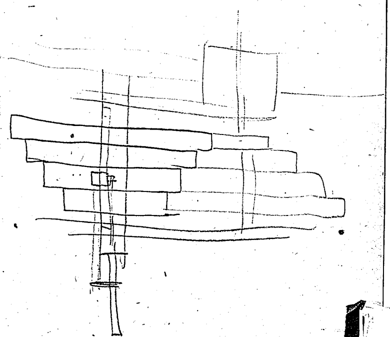

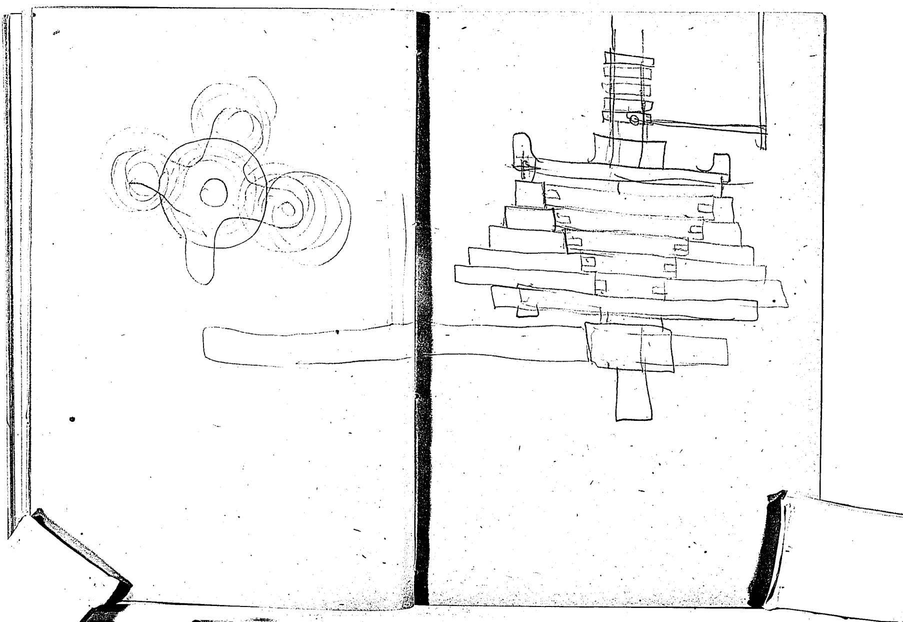

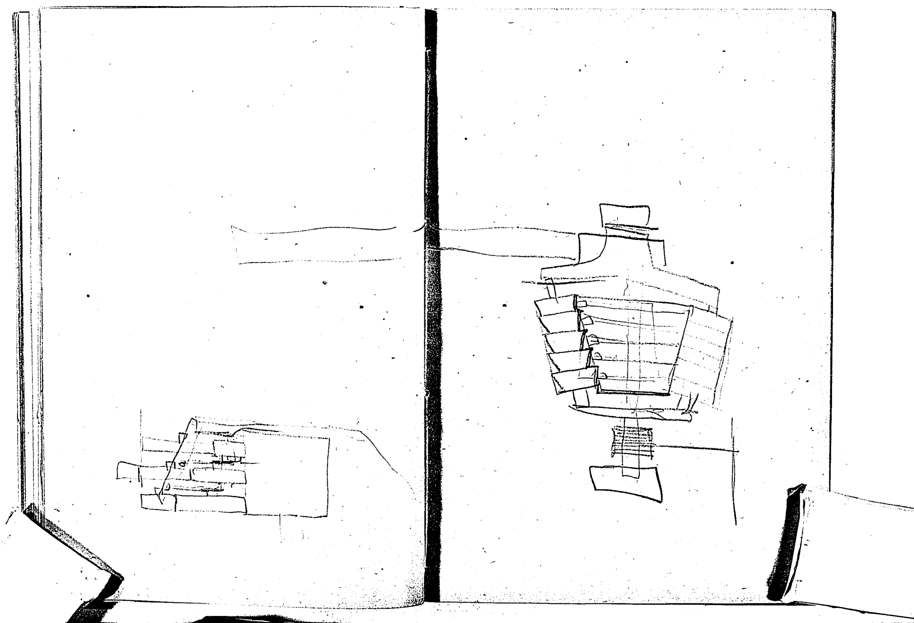

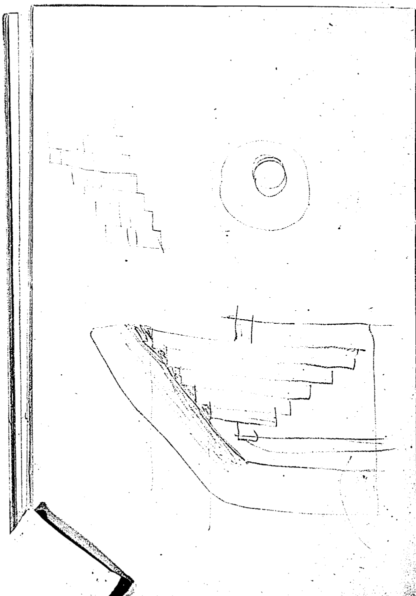
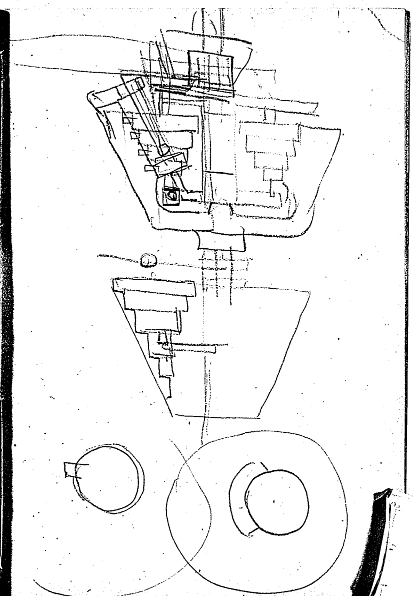

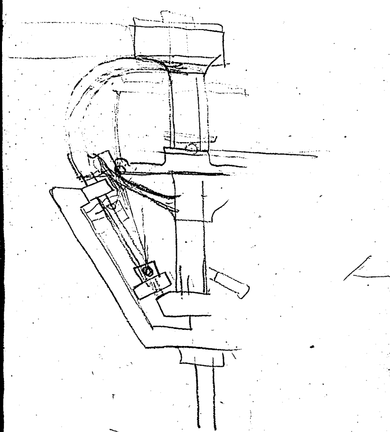

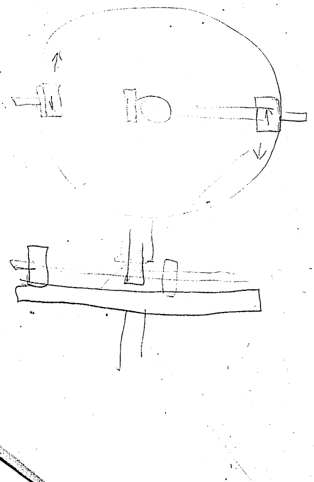

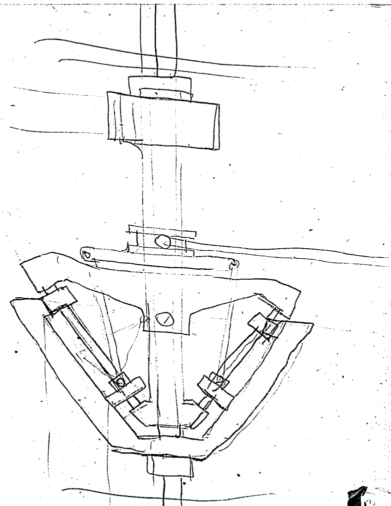

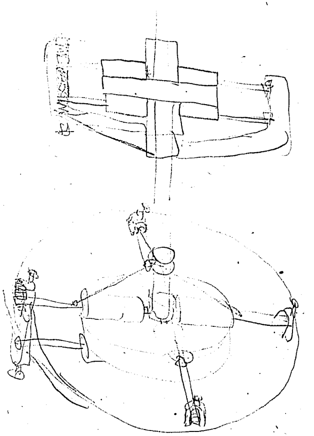

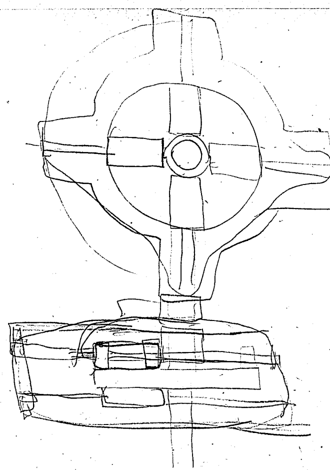

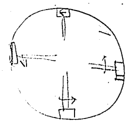

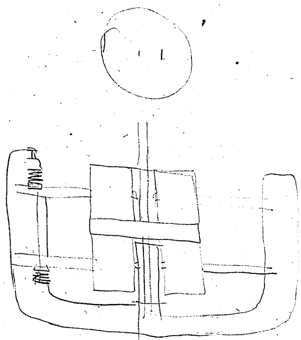

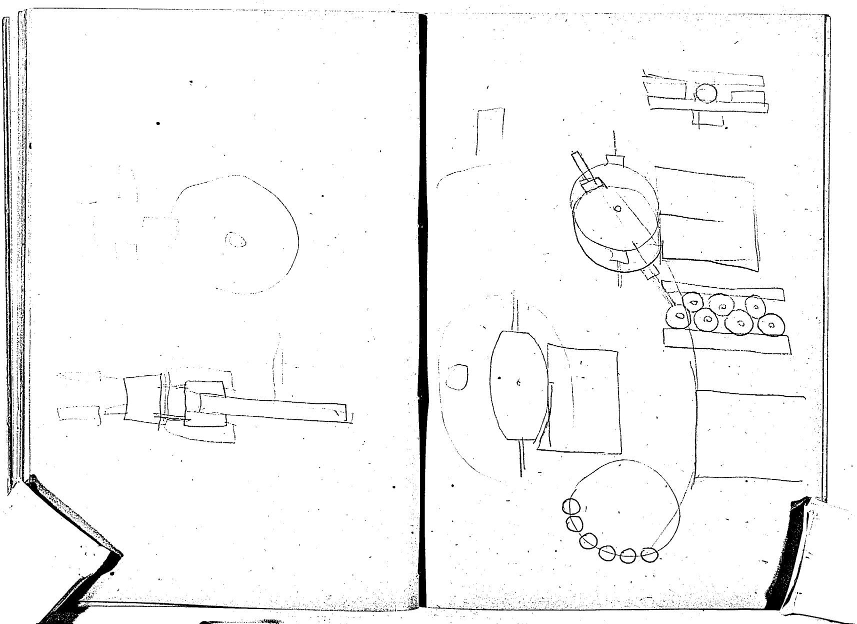

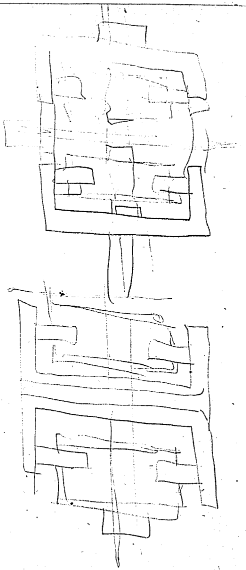

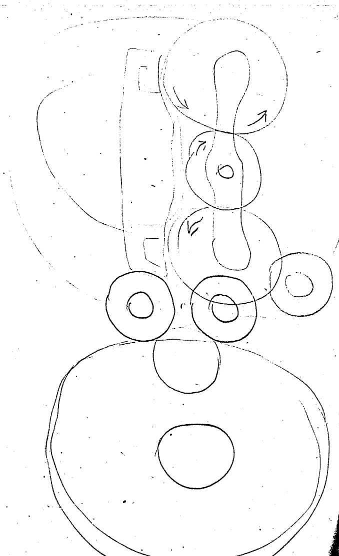

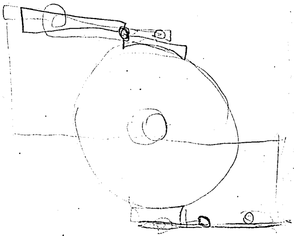

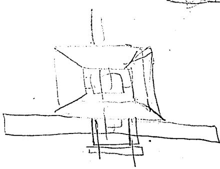

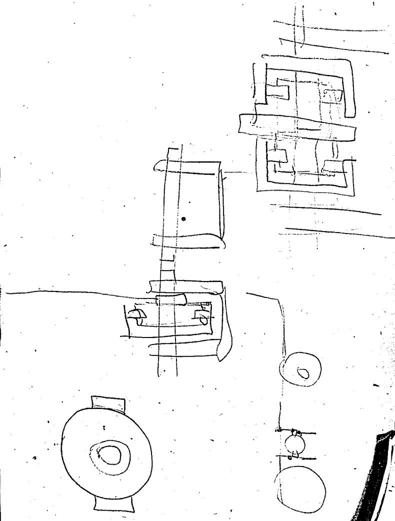

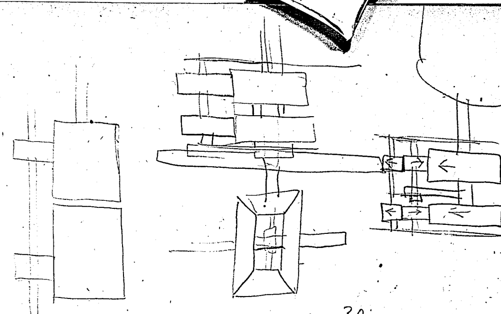

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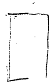

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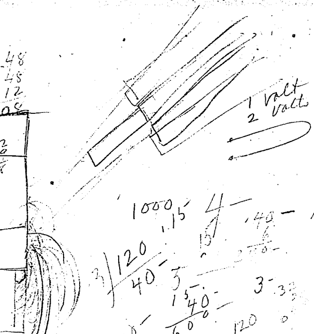
35 Volts
4 amp

35 4
4
140 8
70
35 16



1 Volt 1 amp
2 Volts 1 amp

1000 .15 4 .40 15
3 | 120 15
40 5
15 40 3
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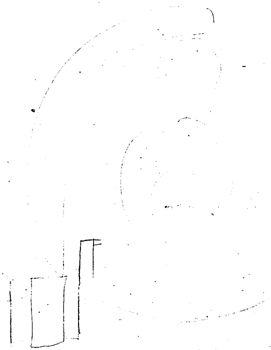

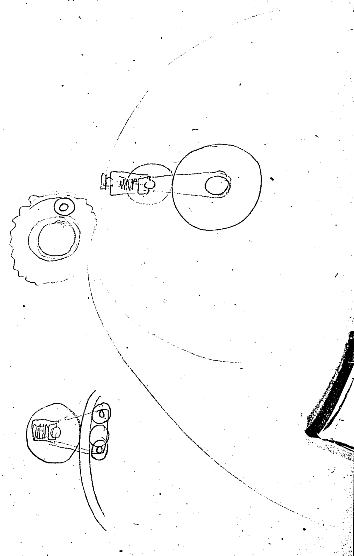

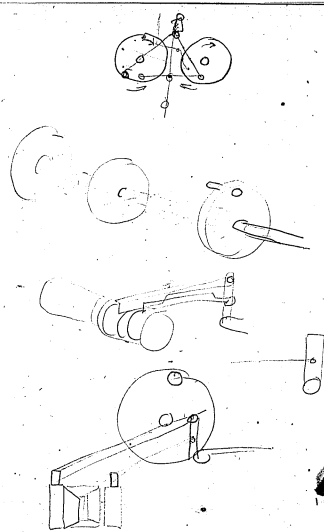

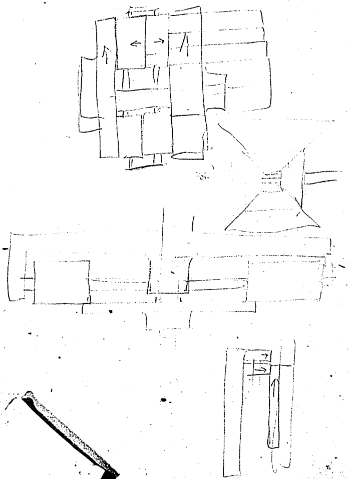

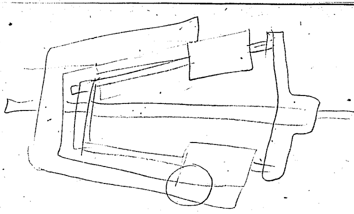

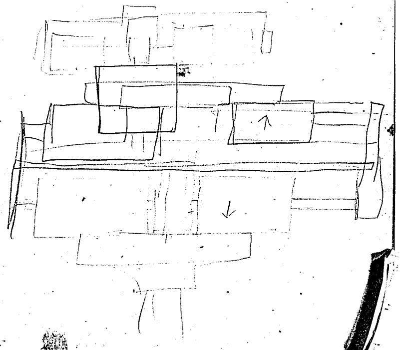

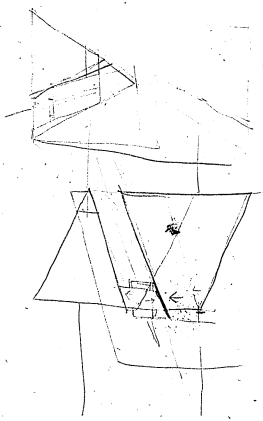

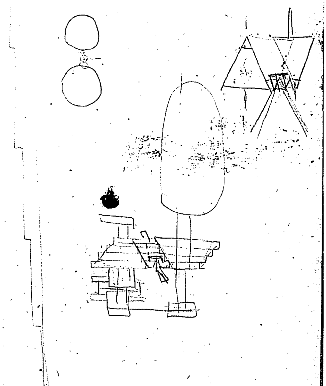

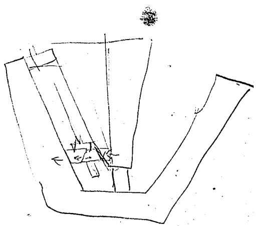

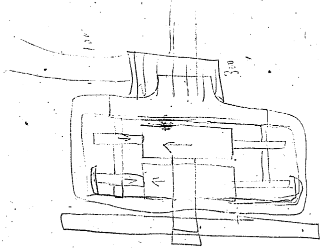

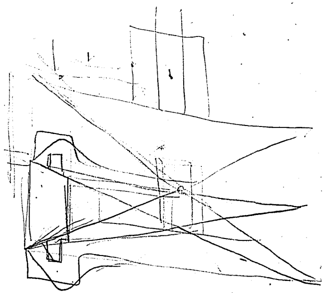

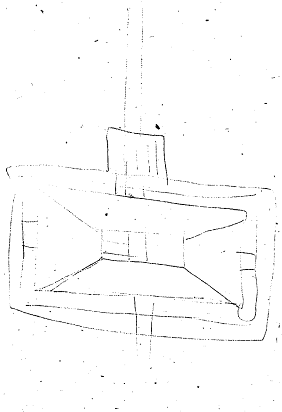

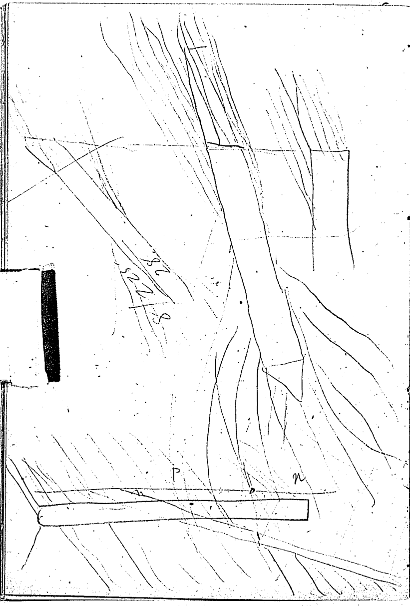

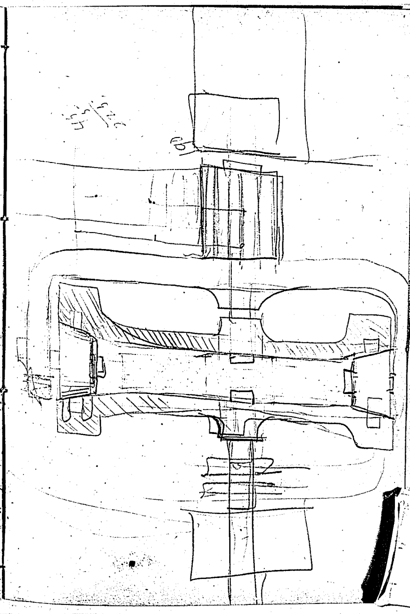

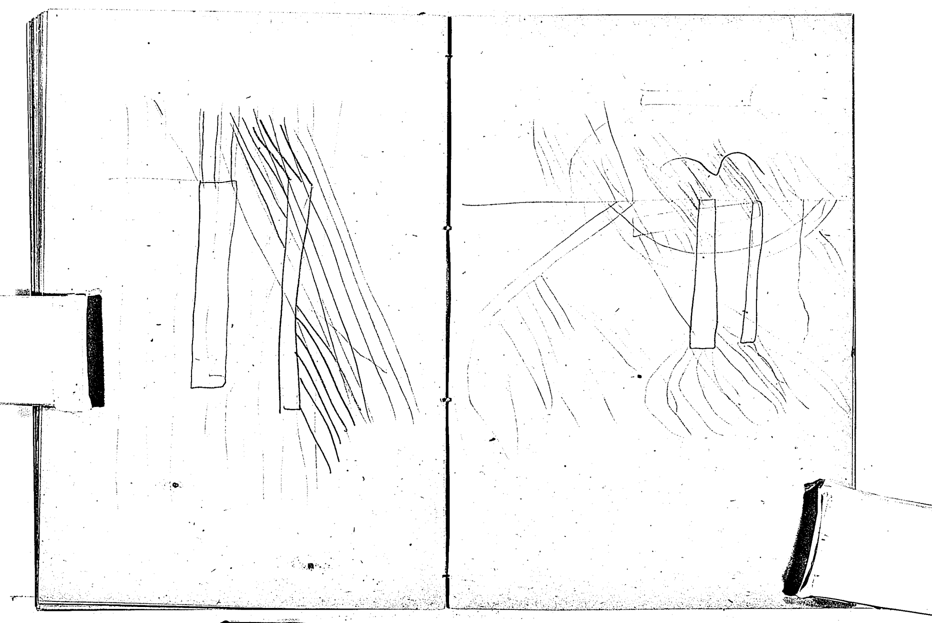

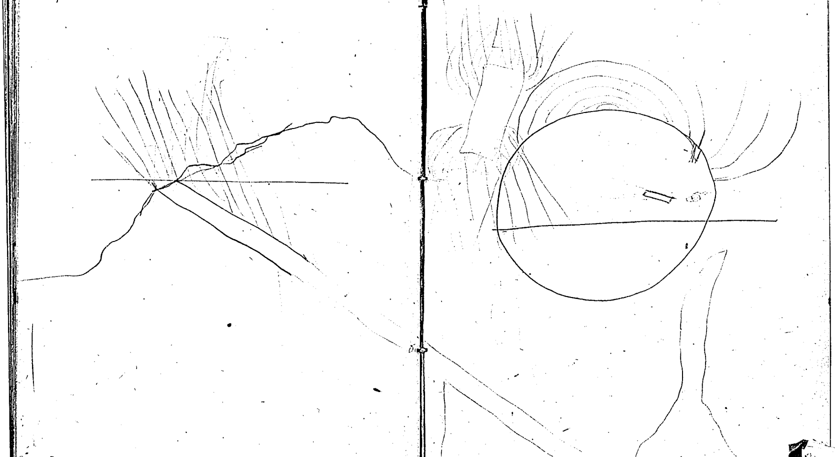

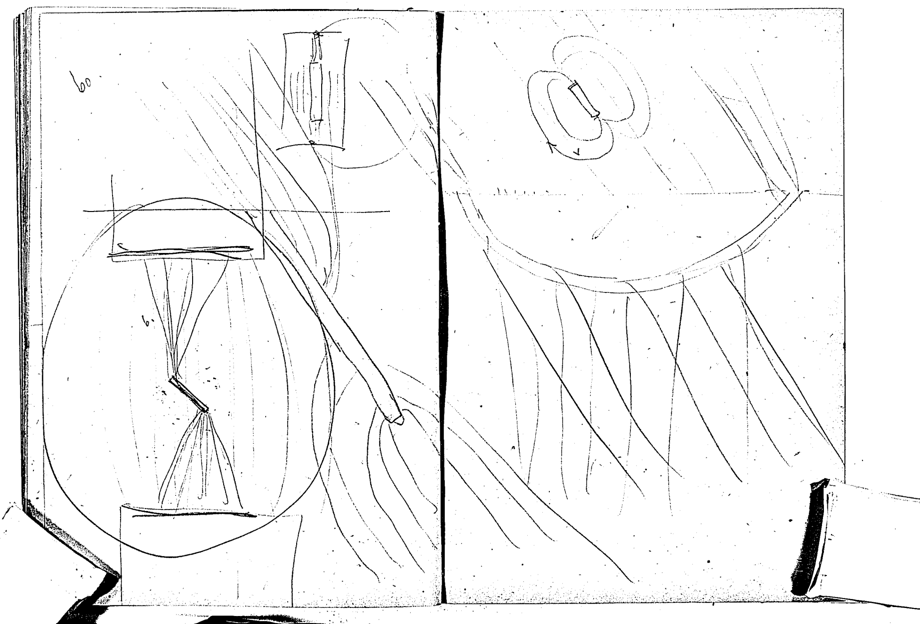
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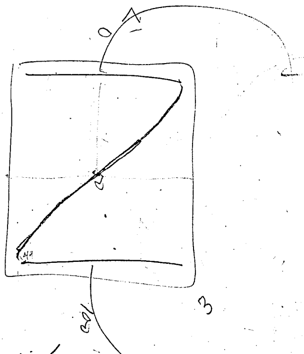

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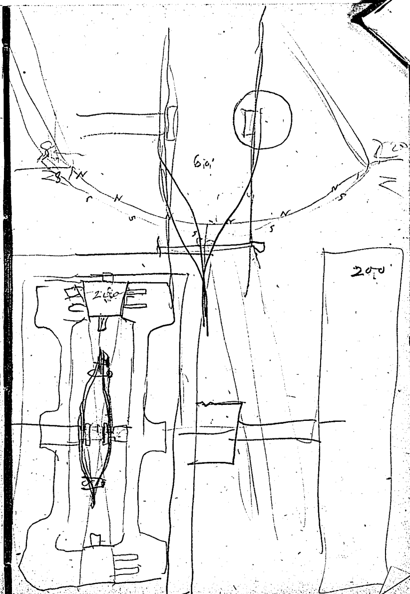

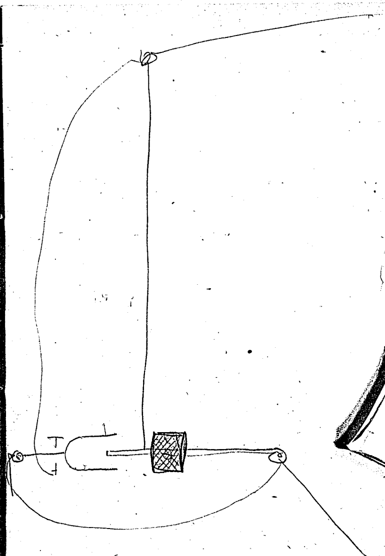

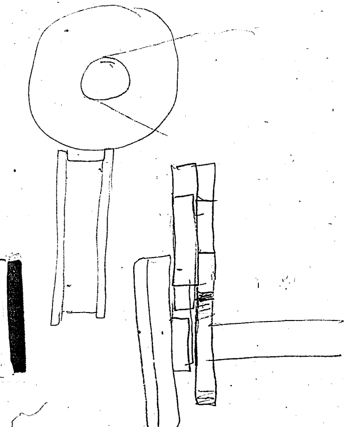

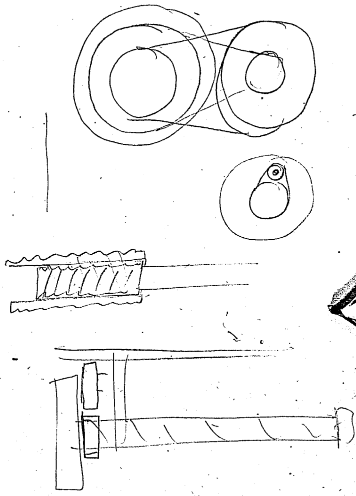

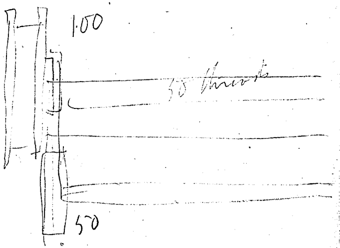
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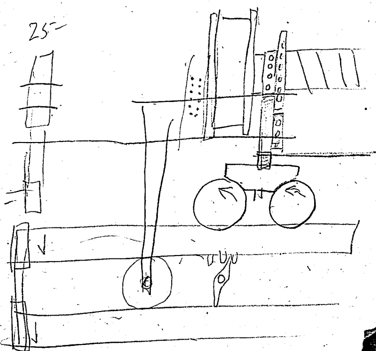
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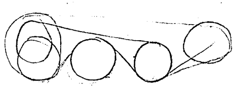

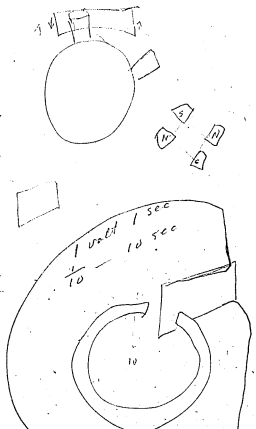
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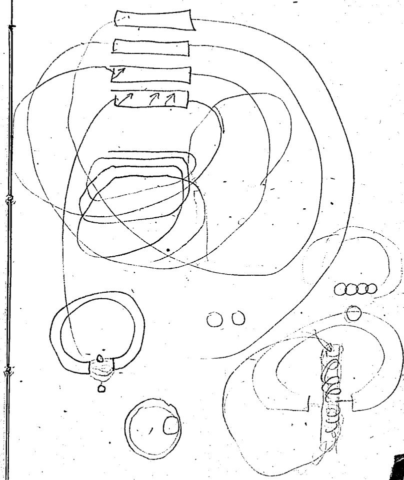

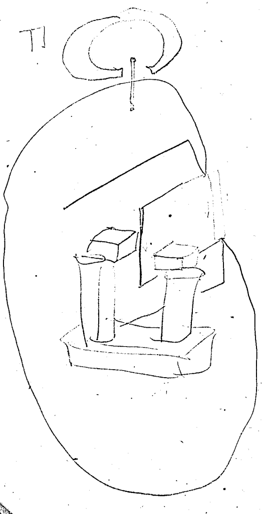

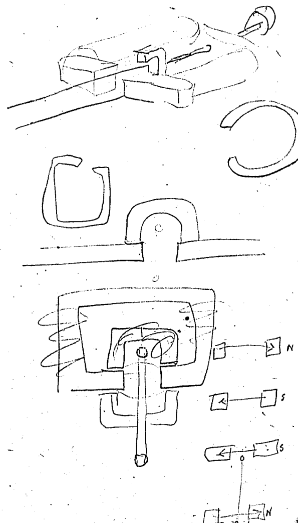
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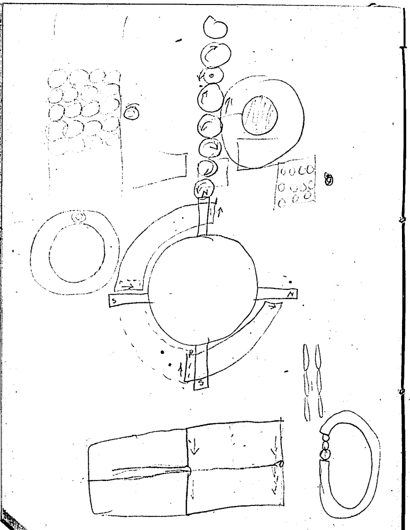
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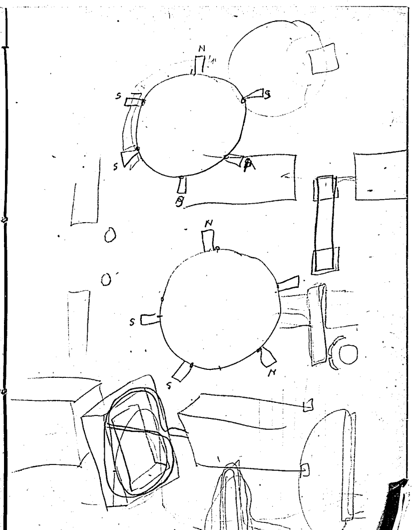
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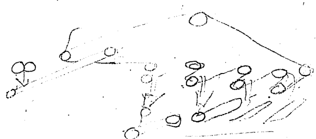

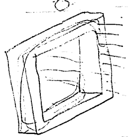

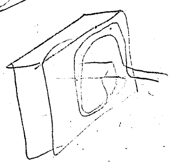

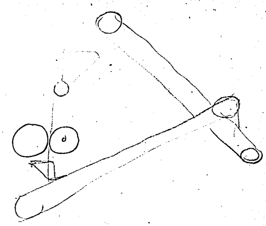

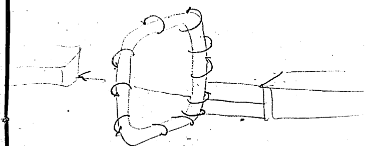

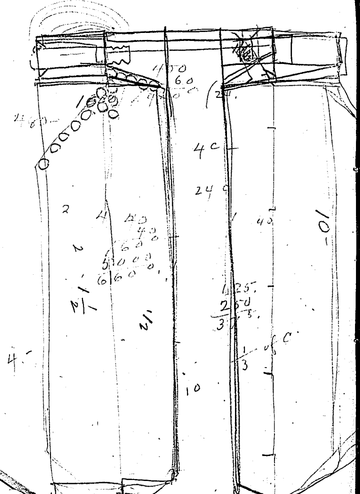
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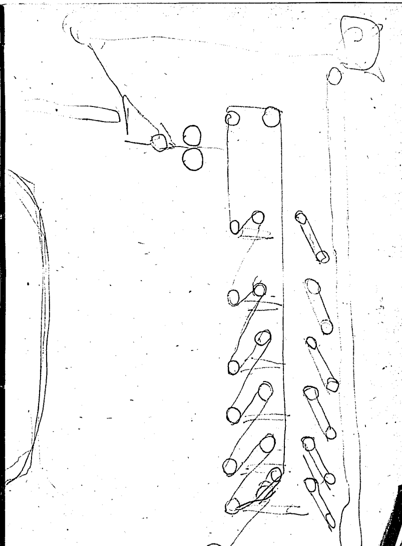

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2 Helpers	3,00	3,00
3 - Chemists	3.75	—
1 foreman	1.75	1.75
1 pug boy	80	.80
1 brick boy	80	80
3 Loading boys	240	240
1 Furnace fire boy	80	.80
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1 Cart & man	250	
2 Laborers	250	250
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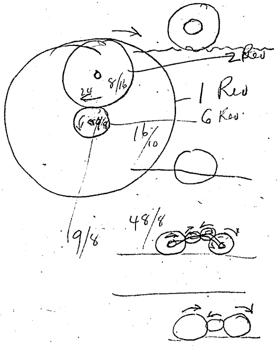
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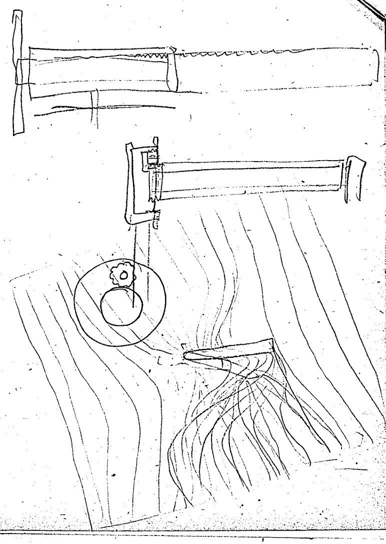

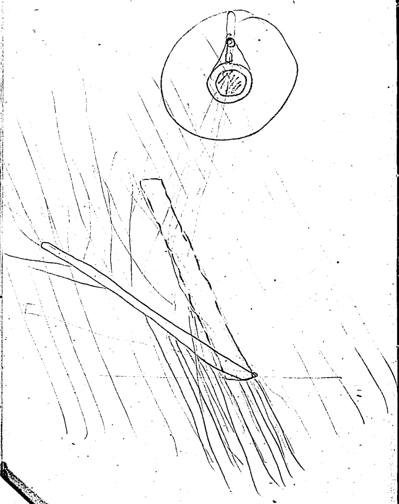

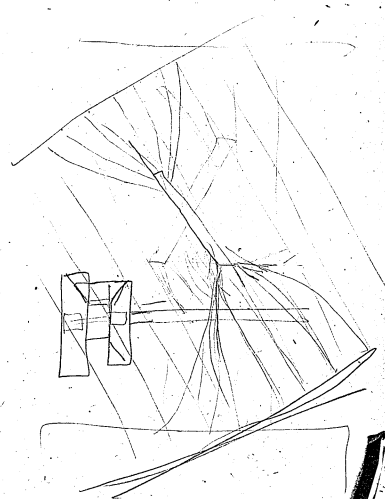

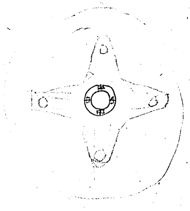

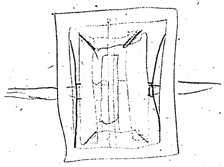

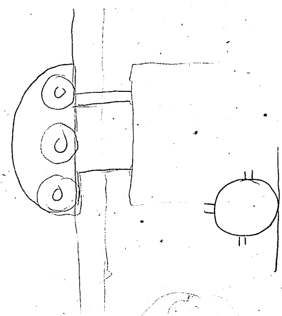

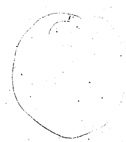

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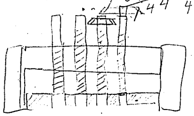

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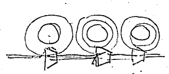

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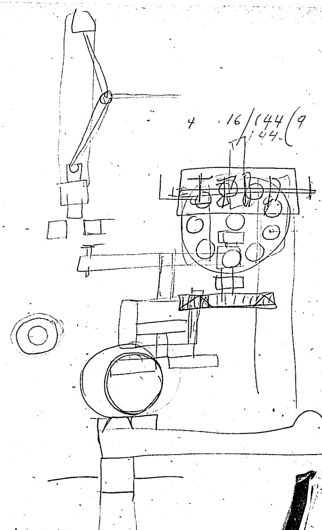

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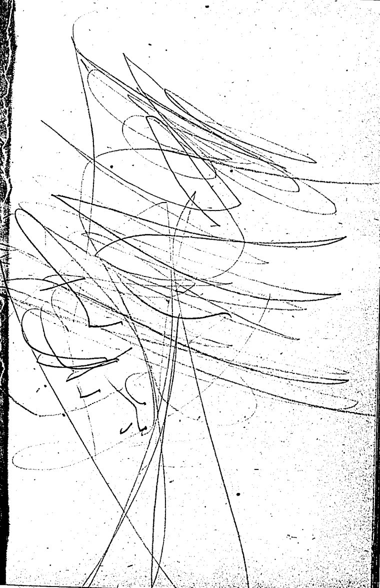
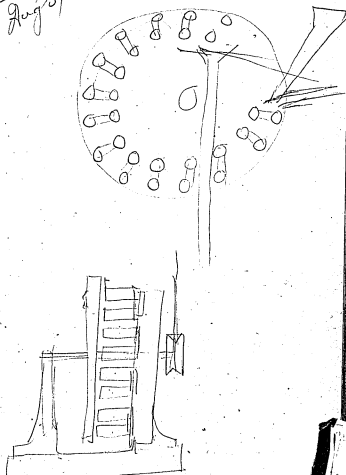
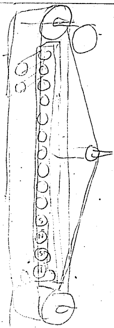
[THIS BOOK WAS USED IN BOTH DIRECTIONS.
THE FOLLOWING PAGES WERE FILMED FROM
THE BACK END FORWARD.]



Caveat

Aug 3/90





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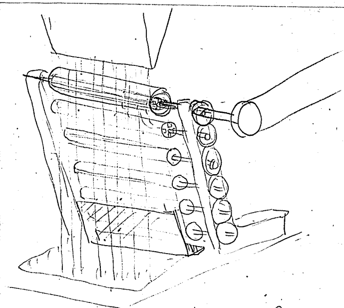

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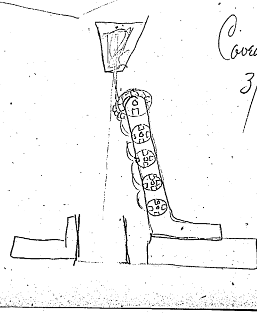

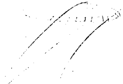

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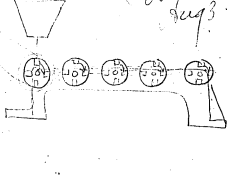

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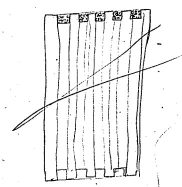

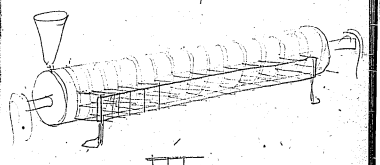

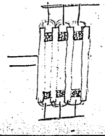

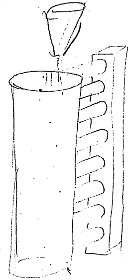

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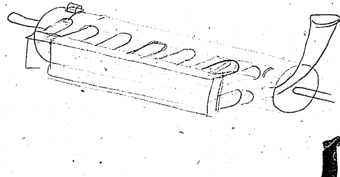

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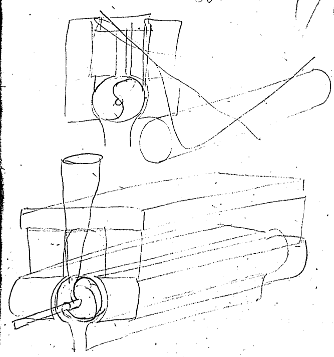

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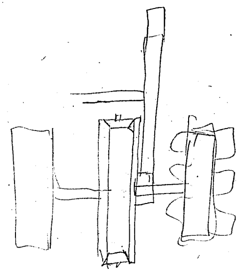

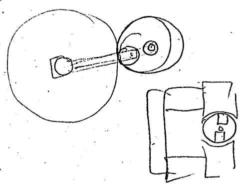

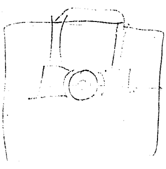

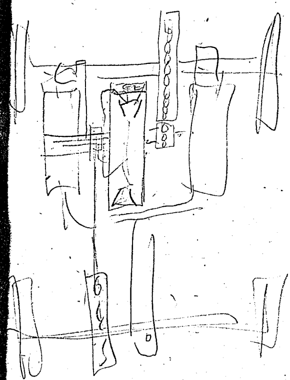

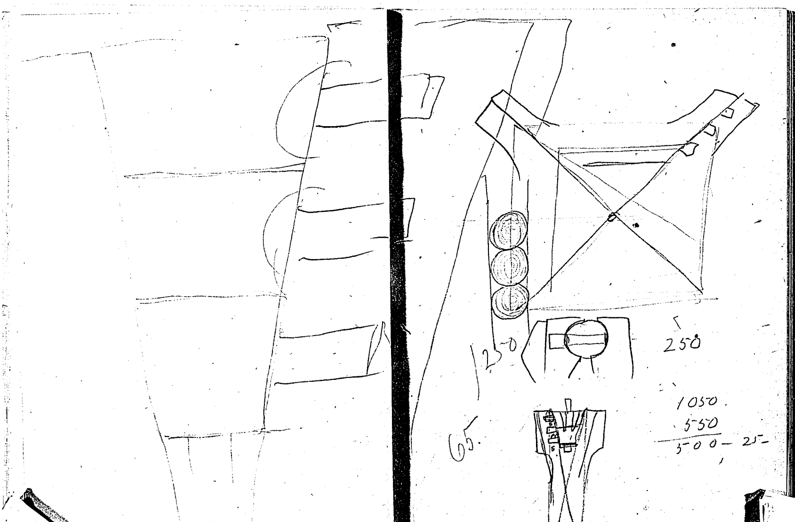

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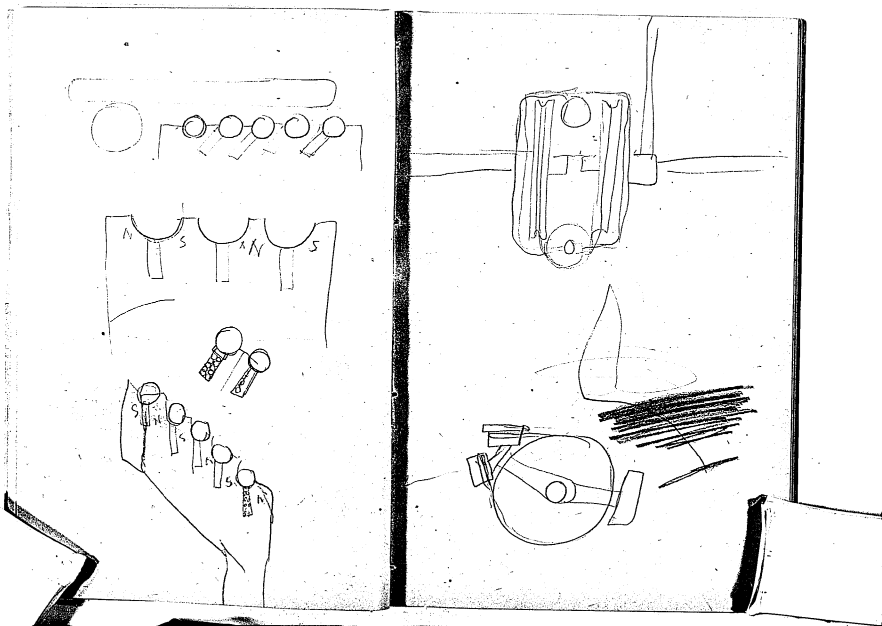
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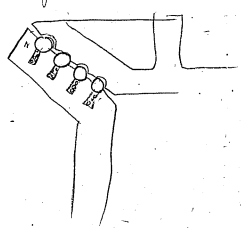
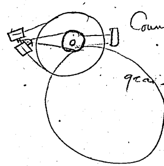
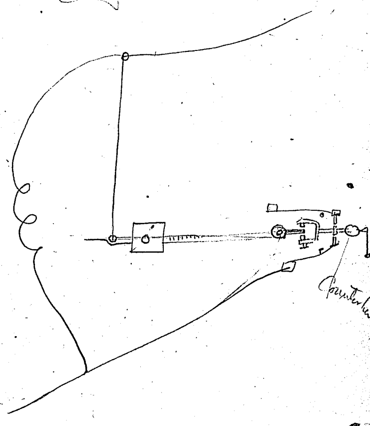
Caveat of Aug 5th,

Magnetized Belt



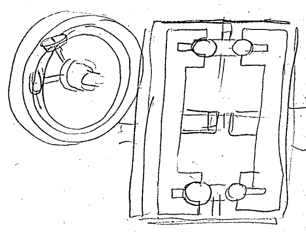


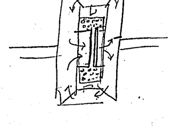
Alternating Meter, Caveat Aug 5/90

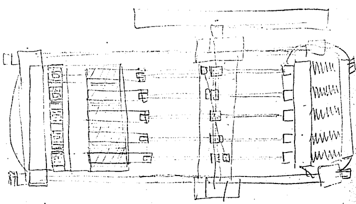


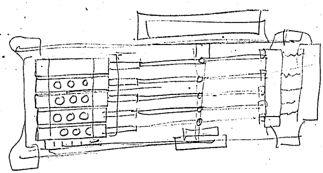
Caveat Aug 5 96

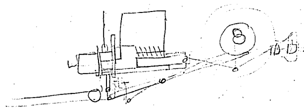
Inside steel belt, magnetic

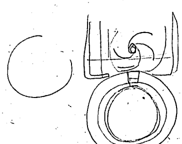


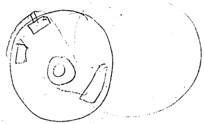


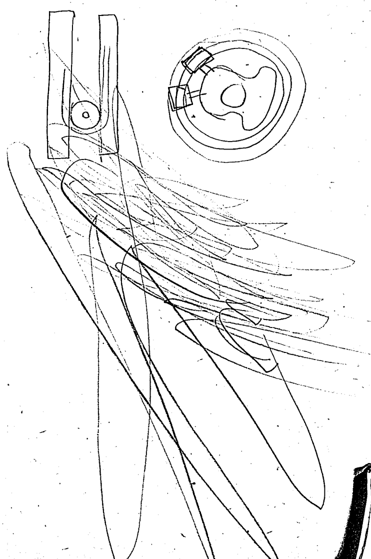


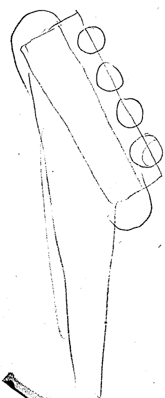


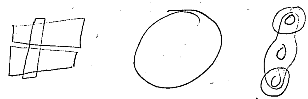


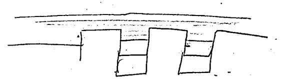


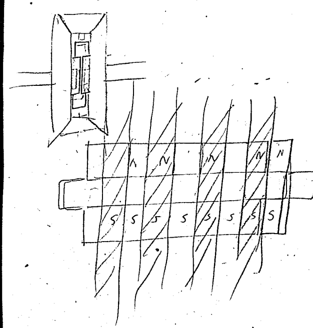








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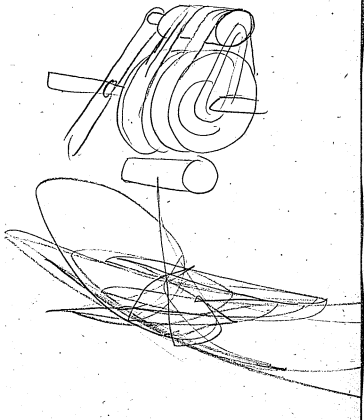

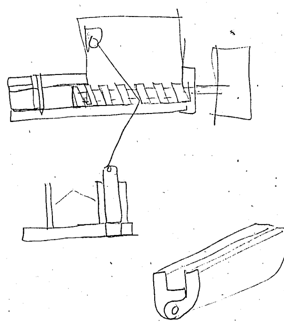

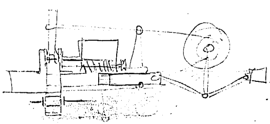

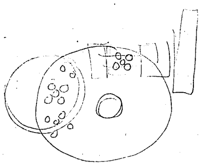

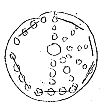

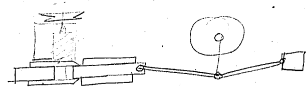

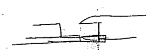

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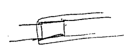

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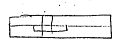
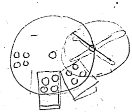
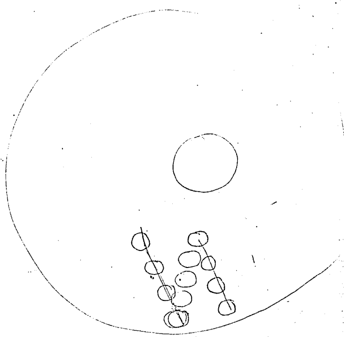
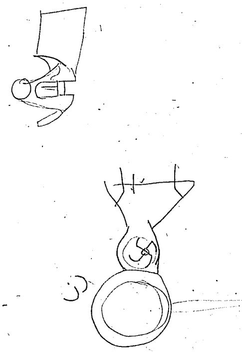








Notebook, N-90-11-07.1

This notebook covers the period November 1890-January 1892. All entries are by Edison. The book contains a list of chemical compounds, nos. 1-28. There are also notes regarding carbonization tests for compounds; these entries are possibly related to Edison's filament experiments. The front cover is labeled "Book #6007 [607?] Nov 7/90." The spine is labeled "115." The book contains 71 numbered pages.

Blank pages not filmed: 36-43, 54-67, 70-71.

No 1	Oil of Orange
	" " Spike
2	" " Angelica
3	" " Sandelwood
4	" " Papaver
5	" " Pennyroyal.
6	" " Laurel
7	" " Pear
8	" " Horsemint
9	" " Fennel Seed
10	" " Cloves
11	" Juniper Berries
12	" " Riga Balsam
13	" " Cajaput
14	" " Carraway
15	" " Mustard
16	

No 17	Oil of Celery
18	" Fatty ~~Cloves~~ cassia
19	" Myrbane
20	" Tansy
21	" Wormwood
22	" Cedrat.
23	" Spruce
24	" Peppermint
25	" Fatty Jasamine
26	" Cedar Wood. Leb
27	" Citronella.
28	" Balsam Fla.s
29	" Croton.

Nº 30	Oil of Birch
31	" Lovag root.
32	" Bitter Almonds
33	" Sweet Almonds
34	" Mace
35	" Pumpkin Seed
36	" Thyme Red - A.
37	" Star Anise
38	" Pinus Sylvestris
39	" Matico.
40	" Amber.
41	" Lemon
42	" Stoneblack
43	" Lavender Garden

No 44	Oil of Fatty Violet
45	" Hemlock
46 ✓	" Sassafras
47 ✓	" Savine
48 ✓	" Copabia
49 ✓	" Bergamat.
50 ✓	" Fireweed
51 ✓	" Pimento berries
52 ✓	" Male Fern
53 ✓	" Nutmeg
54 ✓	" Rosemary
55 ✓	" Wintergreen
56	" Bay
57	" Ergeron

No 58	Oil of	Olive
59	"	Liquolve
60	"	Organium
61	"	Valerian
62	"	Extract Hemlock
63	"	Apple
64	"	Ginger
65	"	Parsley
66	"	Ergot
67	"	Stillengia
68	"	Dill
69	"	Sage
70	"	Lobelia
71	"	Canada
72	"	Commin Seed
73	"	Rhue
74	"	Corrinder

No 75 Oil of Horseradish
76 " Golden Rod
77 " Verbena
78 " Tint Ambrgris
79 Aldehyde
Para Aldehyde
80 Terebene
81 Xylene
82
83 Oil of Limette
84 acetone
85 Oil of Henbane
86 " Cinnamon
87 " Meliss
88 " Capsicum
89 " Chamamile
90 " Cardomon
91 " Beechwood

13

No 92. Oil of Parafine Oil

93 Creosote

94 Sulpho-Vinosum Acid

95 Butyric Ether

96 Valerianic acid

97 Monochlorophenol

98 Cressylic Acid

99 Sulfocarbolyamin Allyl.

100 Anthrac Benzine

101 Amylum Hydrat.

102 Eucalyptol

103 Styrone

104 Tyrotrauben Saure

105 Valeraldehyde

106 Methyl oxyd-acetic

107 Salicylos acid

15

No 108 Chenolin
109 Sebacylic Ether
110
111
112 ~~Napthalene~~ Alpha Monobromat
~~Neu[illegible] Losu~~
113 — Neu[illegible] Losung
114 Dichloroacetic acid
115 Undecylen Acid
116 Safrol:
117 Amyl Iodide
118 Propionic Acid
119 Nitrosodimethylen
120 Furforol.
121 Aether Salicylic
122 Carbolic Camphor
123 Benzoic Ether

No 124. amyl Valerianate
125 Caprylic
126 Styrol
127 Carbon Tetrachloride
128 Valerianic Ether.
129 Methyl Salicylate.
130 Methyl-oxy-Benzoic
131 Toludin Ortho
132 Phenylhydrazin
133 Oxalic Ether
134 Myrtol
135 Monochlorhydrin
136 Pyridine
137 Amyl Oxide Formic
138 Aethylamine
139 Amylum Chlorat

No 140 Amyl Nitrate
141 Hypnon
142 Isopropylic Alcohol
143 Cymol
144 Cuminol
145 Aniline Pure
146 Butylsulfocyanat
147 Cumol
148
149 Aethylen Chlorohydrin
150
151
152
153
154
155 Propyl Valerianic
156

No 157

158 Carbon Bisulphide

159 Isobutylamine

160 Pseudocumol

161 Picolin

162 Aseptol

163 Wood Alcohol.

164 Allyl Sulfid

165 Toluidin Meta.

166 Cumidin – Isopropylamide Benzol

167 Benznitrile

168 Cinnemic acid. Zimtsaure

169 — Duplicated = (Isobutylamine)

170 ~~Butylchloral~~

171 Isopropyl butyric

172 Chloropicrin

175 — Propyl Formic

176 — Nitrostylol

177 Isopropy[illegible] Bromide

173 Isobutylaldehyde

174 Isobutylbromide

No 178 Methylpropyl Ketone

179 Isobutylen Zalt

180 Amyl Propionic

181 Methylsulfocyanat

182 Isobutylisobutyrat

183 Isobutylnitrate

184 Amyl Ether

185 Butyl Nitrosium ✓

186 Proponitrile ✓

187 Isobutylacetate

188 Methylisobutyrat

189 Methyl Propionic

190 Dimethyl Aether Carbonol

191 ✓ Isopropyl Alcohol, Duplicate

192 Isobutylbutyrat

193 Isobutylacetate Duplicate

No 194 Butyliso Formic
195. Tetramethylammon 10%
196 Isobuttersaure ?
197 Di Methyl Reorcin
198 Aethylen Monacetat.
199 Amyl Rhodanat.
200 Amyl Sulfurat,
201 Capronic Ether,
202. Methyl Butyric.
203 Pseudo Butyl. Alcohol
204 Diphenyl Methane,
205 Iso Butyl Nitric.
206. Diphentin
207 ~~Amyl~~ Amyl Mercaptan
208 Propionic Ether.
209 Xyliden -
210 Malonic Ether

No 211 Trimethyl Carbonil
212 Methylen Iodide
213 Kresol-Meta
214 Pyridin Chlorat,
215 Isobutyl-Iodide
216 Isobutylen, Bromide
217 Benzyl Bromide
218 Hexyl Iodat - aus Mannit
219 Isopropyl Iodide
220 Ether Disulfuret.
221 Zimmtsaure-alcohol.
222 Propylacetat,
223. Propyl propionic
224 Benzolmonochlorat.
225 Kriesol = Ortho
226 Ether Sulfuret,
227 Methylacetessig Ether

No 228 Ethyl Trichloroacetat.
229 Ethyl Dichloroacetate.
230 Methyl ~~Jodat~~ Iodat
231 Methyl Cyanide
232 Ether Pelargonic
233 Anisaldehyde
234 Styron
235 Propyl-Chlorat,
236 Iod-Benzol
237 Phtalylchlorid
238 Salicylic Ether
239 Methylanilin
240 Formamid
241 Methyloxyd-Salicylic
242 Dichlorohydrin
243 Ether Rhodonat Sulfocyanat,
244 Methylamin 33%

No 245	Xylenol
246	Butyrl Chlorat.
247	Carbonic Ether.
248	Nitromethan
249	Butyron
250	Nitropenthan
	Nitroodiethylin
251	
252	Butyrin
253	
254	Aethylbenzol
255	Propylaldehyde
256	Benzphenon
257	Aethylen Alcohol.
258	Butyl Mercaptan
259	
260.	Proponitrile

No 261. Tolualchlorat
262 Octylic Alcohol
263 Trimethylamin Hy— duplicate
264 Oenthal
265 Diethylanilin
266
267 Nitro-oxylol Para
268 Benzol.
269 Chloroform
270 glacial acetic acid
271 Benzene
272. Naptha — also Tetraethylammon
273 Glycerine
274 gasolene
275 Turpentine
276 Absolute Ethyl alcohol
277 Reg " "
278 ~~Methylic Alcohol~~

279 — ~~Anthrac Benzene~~ Apiol.
280 Methyl Bichloride
281 oil Cade —
282 Nitrite Amyl.
283 Benzoyl Chloride
284 Xylol.
286 Ammonia
287 Kerosene
288 — Benzol Sulpho Chloride
289 Pyro Gallol Dimethyl Ether

Anilin Braun - Bismarck -
pharah considerable -
little but more than Indulin
dont melt like Indulin
has considerable red ash
& pieces quartz = dif Comb
Charcoal. —

Nitroso-dimethylanilin
Hydrochlorat, its like treacle -
boils & phanos some but
Charcoal shiny —

Anilin Blue Cautic ? kind
full arsenic — Dont melt

Tropaeolin — Red — cant read
bal — Dont phos scarcely
any think arsenic in it.

Napthalene alpha di
Chlorated — Melts Easy
may do as [illegible]
by heat.

Anthrarobin — melts
dont phos much CS_2
to very hard — may do as
heat binder great deal
sublimate —

Hoffman Violet. dont phase as much as Indulin — melts in 1st start, by slow Clyn small puff — as this is very soluble may be good —

Anilin Red Congo — dont swell or stick together, Carbon dull — will test for ash — ash great, what is left soils

Anilin Gelb — Martius
Explodes —

Anilin Roth fuchsine arsenic free
melts very little on crystals by slow ... no fuss — awful hot sublimate forms Carbon — ash —

Negrosin Red Water dont swell at all — ash

Anilin Blue Methylen
fuss of quick, seems melt at bottom but slow clyn thinks it will be OK,

Anilin Gelb — Melts, fuss peaceful, if done quick —

Santonin Melts —
no Carbon —

Anilin Green Methyl
for arsenic - melts fairly
Easy - practically no faro
contracts to solid carbon
good binder if no ash
or Dextrin or gum -

Anilin Yellow T.

dont puff or slightest carbon
hard - pbly lot ash - full ash.

Anilin Sulphate Water
goes off then Carbons
Solid Carbon - Not any thing
pbly cause nothing melts -

Anilin - Rose Regal -
dont melt, Violet sublimate -
pbly lots ash - testing for it -
no ash -

Anilin Red Ruby Orange
ng - faro horrible big ash.

Anilin Blue - reddish -
dont puff or melt, test
for ash - full ash, horrible

Anilin Green -
Cant make out name
mark + X - dont melt or puff -

fluorsceni - melts, good binder for 20 —

Aniline acetate semi melt good binder for No 20 —

January 24 1892 —

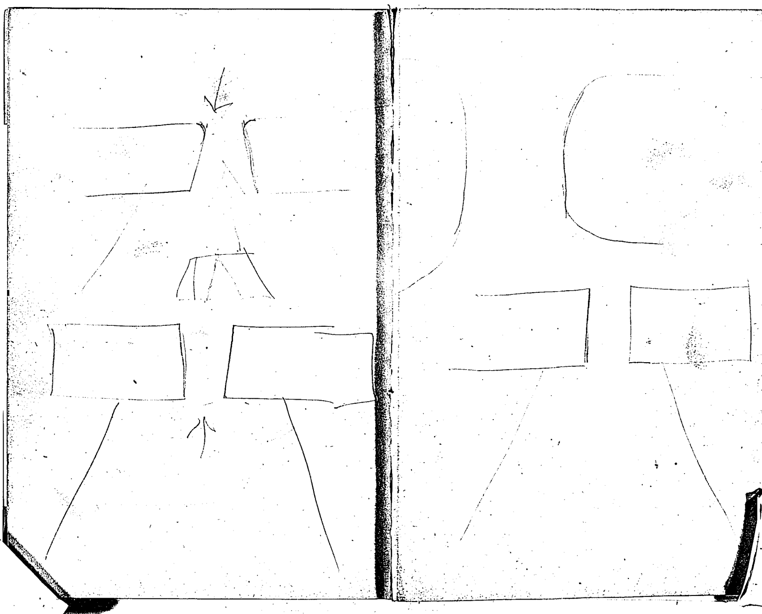
Expmts on residues for fils —

Citric acid in small Evap dish on sand bath scarcely any residue

Gallic acid nearly all Volatiliz(ed) residue black not sol chloro but sol [illegible] dipi — about 2 pct Residue left —

Leaf shellac big residue — but appears insoluble —

Bay Wax.



Notebook, N-90-11-07.2

This notebook, which covers the period November 1890-September 1892, is a continuation of N-90-11-07.1. All entries are by Edison. At the beginning of the book are notes regarding some of the 289 compounds from the preceding book, tested as solvents for syrian asphalt. Also included are notes relating to carbonization tests and to squirted filament experiments, as well as drawings and calculations, probably pertaining to ore milling. The front cover is labeled "Book #6008 [608?] Nov 7/90." The pages are unnumbered. Approximately 100 pages have been used.

N-90-11-07.2

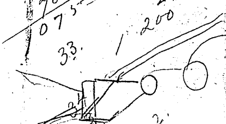
225
200
45000

300
475
700
1075

1075
1300
2600
1200

450
300
35000

33



$\frac{1}{2}$ 10$\frac{1}{2}$

22
6
13$\frac{1}{2}$

4
2
1

$\frac{1}{4}$
$\frac{1}{8}$

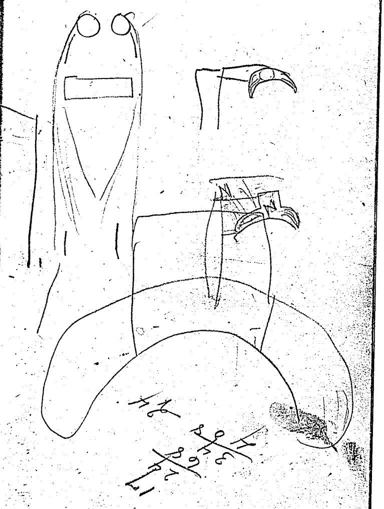
3.)34
11.1

300

13
14
14 hours

280

5. 2095



Oxidized Linseed Oil. Solvents.

182. Isobutylbutrat. Semi solvent disintigrates it but only 1/2 apparently disolved.

213. Kresol Meta_ swells it up very much -

221 Zimitsaure - Alcohal, swells it very much cant say it disolves as whole of liquid, was absorbed added more -

219 - Isopropyl Iodide · disolves whally —

145 - Anilin swells & partially dissolves its -

135 = I think $\frac{1}{3}$ to 1/2 dissolves

62. Extr. Hemlock dont dissolve turns it white -

132 Phenylhydrazin - perfect solvent,

149 - Aethylchlorohydrin dissolves fair & ~~disintegrates~~.

174 Isobutylbromide, perfect solvent with very slight sediment,

159 - Isobutylamine perfect solvent -

113. Neurin Lösung - good solvent.

244 - Methylamine 33% - dissolves but pbly combination = dirty =

245 - Xylenol - swells it greatly absorbed all solution can't say if any dissolved put more solution in -

---

246 - Butyl Chlorat. swelled &
solution all gone put more in

251 - Nitrosdiethylen, swelled.
Liquid gone - put more in

225 Kresol - Ortho - swelled
Liquid absorbed put some in

234 - Styrone - swelled
dont think it has disolved
any -

233 Anisaldehyde - swelled
Liquid absorbed cant say it
disolved any - put more in -

237 - phthyl chloride swelled absorbed - didnt put any more in -

268. Benzol - good solvent for 80 pct of it which sediment appears to be unchanged stuff & dirt -

272 Naptha - good solvent for 80 pct - about same as Benzol -

160 - Pseudocumol - swelled & made light yellow dont think any dissolved -

270 glacial acetic acid
8/2 solvent - disintegrates

276 - absolute alcohol
nearly dissolves it - put fresh
in + about $\frac{1}{4}$ clear dissolve
probably whole will
dissolve with plenty liquid
+ time. - This mixed with
Naptha or Benzol may do
the biz =

166 - Cumidin-Isopropylamide Benzol
swells - absorbed liquid
filled it up again

fits -

Dec 16 -

Nitric 1.45 Baume -

No 1 12 grams Sugar in Each

Water 300 cc - 60 acid

No 2 - 300 cc - 100 acid

No 3 300 cc, 40 acid

No 4 200 cc = 150 acid

No 5 200 cc 100 acid

No 6 150 cc - 100 acid

No 7 100 cc 100 - acid

No 8 70 cc 100 acid

No 9 - 50 cc 100 acid

No 10. 30 cc 100 acid

Started Soaking Syn
at 10 30 am. Dec 16.

No 10 softened and balled up
Nitrous fumes comes off considerable
quantity.

No 9. Semi balled but floats
over top whole dish - Red fum

No 7, 4, 8 dont balls some
Red fumes - all other quiet.

No 11.

70 Nitric
70 water
70 HCl

12 grams Syr —

[illegible] 2 pm Dec 17

Nos 10, 9, 8, 7
Filtered at 3 pm Dec 17

6 5 4 3 2 1 – finished
at 10 pm 17th –

No 10 Rescdue after Exhaustion with Wood alcohal -
6 grammes 7 Decagrams

No 10 Before Exhaustion with alcohal puffed more than old unpurified.

Purified No 10 - decomposes all at once dont swell - Large Volume smoke comes off all in 2 seconds then ceases and dont show any Combustion when lowered in flame - dont puff at all - Smoke very inflammable,

No 9 Puffs more than old regular
when unpurified — when
purified by alcohol weight
of residue 7 grammes 8 Decagms
purified by alcohol dont puff —
decomposes like No 10 but
takes 4 @ 6 seconds, no inflamable
matter when lowered in flame

No8. Unpurified swells about the same as ~~Old Pug~~ 4 & 7. but ~~not as much~~ combustable comes off by far as in 4 & 7.

Purified by alcohol dont puff in least. - takes some time say 10 @ 15 seconds to decompose, then on lowering in flame no combustable, The particles scintilate showing no softening material at all in it to lock particles together. Weight 8. grammes

No 7. Unpurified puffs.
about same as 4 —
purified. Weight of Residue
7 grams / Decigrams

Purified no puff whatever.
takes long time to decompose.
20 @ 30 seconds — afterwards
Lowering in flame no combustion
scintillations, plentiful.

No. 6. Unpurified
~~puffs~~ more than red
Regular -

Purified Weight
8 grammes 4 ~~[illegible]~~ Decagram
~~Purified~~ puffs slightly
towards End when put into
flame after I thought it
was ok - until then it
didnt puff - takes long
time to decompose. think
from looks it has largest
Residue after decomp but
I may be mistaken -
dont decalculate. yet
there dont appear much locking
matter as you can see particles

No 4
Unpurified don't swell as much as old Reg
Weight of purified 8 grammes 7 Deca
purified decomp. very slowly and don't puff except at end of heat it swells up from underneath probably because I took too much. Its swelled little more than 6. Seems give great residue - scintilates little on top =

105 Unpurified –
puffs quickly lost
unchanged Syrian mit
Weight after Exhaustion
alcohol 8. grams 3. Deci
Puffs some towards final heat
at bottom. There is probably
some unacted on Syrian which
could be taken out with
Benzol –

Carbonization in Evaporating dish to ascertain Carbonaceous Residuum —

No 4 —

1 gram purified by alcohol after ignition, residue weighed 4.98 milligrammes — Carbonizes very slow.

No 6.

1 grm

Weight after Carbonizn

493 milligrammes

Carbonizes slow.

No 8.

Residue 500 milgrms.

decomposes quickly at first takes 1/2 time to finish as 4 + 6

No 7

Residue 497. milgrams

Takes considerable time to decompose - requires high heat to finally decompose

No 9

Residue 485 -

Decomposes very rapidly at first = I notice when weighing pyrophoric. - Charcoal friable -

No 10 –

Residue 483

Decomposes all at once & quickly finished – Charcoal from B Co.

So far No 7 best

188 lb Coal

$$\begin{array}{r} 144 \\ 12 \\ \hline 288 \\ 144 \\ \hline 1728 \end{array}$$

2240) 376 (3.14

702 (2.43

1728) 4212

6480

2.43
23
729
486
55.89

55
2400
22000
11 0
132000

7) 1320 (188 lb oleo...

24
4
96

Action of solvents
on purified by alcohol

No 10

Chloroform dissolves out scarcely anything
don't viscous — particles keep separate.
Benzol scarcely anything —
pyridin good but not perfect
I think =

No 9 –
Chloroform dissolves scarcely
anything don't viscous — particles
separate —
Benzol nothing
Pyridin good —

No 4

Chloroform sticks it – viscous –
dissolves some to opaque yellow
Benzol colored some –
think if ground & warm
would dissolve considerable –

No 6

Chloroform dissolves quite a lot
more than 4 = Viscous (very) –
Benzol dissolves more than
4 – If hot it avoided
dissolves very considerable –
pyridin not ~~perfect~~ I think.

No 7 —

Chlorofm opaque yellow
Viscous =
Benzol some — hot might.
take considerable —
pyridin good —

No 5

Chlorofm Opaque yellow
Viscous not extra so as
7 =
Benzol dissolves good
deal Looks like unacted
on say —
pyridin good not perfect
I think —

No 5

Chloroform semi viscous -
dissolves to light yellow -
Bengal dissolves 1/2 as
much as Chloroform
pyridine good ~~but not~~
perfect.

No 9 with Cam + chloro
Viscous apparently OK
No 7 not quite so Vis
but good = Cam Evidently
better for 9 than 7 but
think 7 OK =

Syn + Chl water
No 12
750 CC Chlorine Water
by Aylsworth 10 grms
Syn. 3 pm Friday —

Raw Syrian Solvents

Naptha apparently dissolves it good though may be fine specs

Ether takes out something not very much —

Chloroform 1st class

Benzol next,
Pyridin same
Naptha next.

Benzine - takes out something more than Ether.

Methylic Alcohol may dissolve some transparent stuff -

11 am saturday

Experiments oxdzq Syn –

7 A. 18 grammes Sy
100 cc water 100 cc acid

7 B 24 grams Sy
100 cc H_2O 100 NO_3

7 C 30 gms Sy
100 cc H_2O 100 NO_3

7 D 36 gms Sy
100 cc H_2O 100 NO_3

7. E 42 gms Sy
100 cc H_2O 100 NO_3

1

24

100 cc

130 grams

1 to 5

1 lb 15°

Residue of 7. E. after Exhaustion alcohol. 25 grms 600 milgms
The residue dried all night on heater. The Exhaustion by Alc not very good — will reexhaust in bottle over night —

after good purification. 23.500
but some was lost say 24 —

June 6 1891.

Squirted filaments from following

No 1. Trichlorophenol mat. 4 grms Carbut.
about 2 grms trichlorophenol, worked in mortar
till Sticky then 10 minutes kneeding in finger
squirts first class 008 die polished with
diamond dust, smooth very shiny
Note = after 6 months puffs more than No 2
when thrown on hot sand bath –

No 2. 4 grms Carbut 1 Camp, Chlo –
worked very dry – brittle and cracked ingot.
Crumbly when put in press – works fine in
press – dont stick to die, fils round and
Even but surface not good polish. but good enough
Note, 6 months after – puffs but little
when thrown on hot sand bath, globular
swelling only. Surface gets polished –
but with older carbon think it will work
ok – dont swell very greatly when put
right in flame.

No 3 Alcohol Campr unpurified. anilin nitric — works fine in die —
Note After 6 months. ok but can see its rough & porous — very imperfect locking of particles & Cracky — Either must be used alloyed with Carbut or dipped —

No 4 — Purified by Alcohol anilin nitric disolved by phenylammonia previously well powdered — works only fair in die,
Note 6 months after fearfully rough scarcely puffs at all must be alloyed dipped or its ng

---

No 5 — Negrosin — with Considerable Camp & methyl alcohol, afterwards added some absolutely Ethyl al went better. worked well in die
Note — after 6 months found fils all snapped in pieces 1/2 inch long

No 6. Same as No 5 with smaller
Camphor & absolute Ethyl al.
only - works bad in die, probably
lacks Camp to Lubricate.
Note 6 months after all cracked
as No 5

No 7 FaCb$_q$ native by HCl, slow +
careful skimming every little while.
very weak acid plenty H_2O washed in
H_2O dried slow, powdered, then
Methyl al to which say 1/4 or 1/3
$CHCl_3$ added worked in mortar
taken out kneeded - when held over
flame the chunk softens & appears
to dissolve better: works well in
die, soft, it comes out .008 very
round but has a rough surface
which may give it porosity -
Note 6 months after - round even, but
rough & particles not locked together
well puffs out considerably but not
globular as No 2 but more whole diam
increases - will have to have a better
solvent, or used as alloy or dipped

No 8 Falby Native, HCl, Almn. Same as 7 but with Isobutylamine alone - Rough surface, dont squirt well, but could be made to if lumps got out. much
R .009½ .005 & .007 - dont puff ~~badly~~

Note after 6 months. Rough fracture but even & round. needs better solvent or locking material - alloy or dipping puffs more than 2 =

June 8 1891 — New Expmts

No 10
Old Carbut purified well by Methyla
4 gms Cbnt 1 Cam - ~~plen~~ plenty Chloroform - heated - Carbut slightly so I could powder it - Its a very hard thing to get lumps out in fact almost impossible - using 10/1000 die plumbgod made & ingot as well - worked ingot to stiff dough - squirt well -

June 8 - 91.

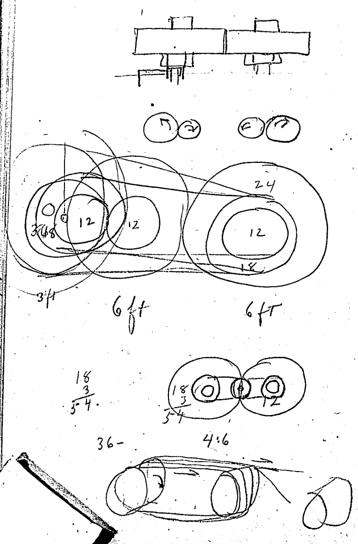
No 11 -

Same as 10 but a good deal of Common Lampblack worked in by fingers - seems to require an Extraordinary amount of Chloroform and when you think it ok you find it in a second hard and brittle, While working in Lampblack must dip ingot in Chloro from time to time & start with very sticky ingot of Carbnet as in No 10 proportions It will probably be better to make the Carbonet very thin and give it time so a perfect solvent action take place to get rid of Lumps due to difficulty of grinding fine and then Kneed it & work in Lampblack. perhaps the Lampblack better be added to the very thin solution all at once & then evaporate down & Kneed —

No 12 Ex purified Reg purifd Caffeine
but boiled in wood al
+ just dried it then is easy to
get a good pulverization in Mortar
the perfect drying with a
little of the stuff left in which
is taken out by methyl a
sticks it together & is
difficult to pulverize
but when the stuff is all
or practically all taken out
by methyl a & not dried
hard the pulverization is
fine & the stirring dries it
perfectly -- No 12 was not a
weighed quantity I was
trying pulverizing experiment
& put considerably more
than 1/4 Cam dry & tried to
work it dry but had to add

Chloro. I added a small quantity of fenol but got too stiff & I then added sufficient ground & pretty well & then worked to very stiff dough - plumbagoed & squirted 10/1000 ie worked fine in die - fits round & polished -

A previous Experiment with small quantity methyl - added to Chloro - caused to work well but fils to work well but they were all rotten so lost all -



I have just completed Carbonz'g
2 moulds of squirted fibres
Freddy started prolim furnace
and run from 75 fahr to 638
fahr in 8 hours — I put them
in Muffle and was 7 hours
getting up to 638, afterwards
took 6 hours to run to
Red hot door which I suppose
was full yellow ~~—~~ with
perhaps tinge of white.
for the last hour full wind on
and as much gas as gave
slight flame 3 inch high
through hole in bottom door —
used Charcoal powder 1/2
inch over all —

No 1 was shiny a good
not puffed - Charcoal slight
little Brittleness little Better

than Reg bamboo oxidized to point ~~but~~ came ~~cared~~ see there were holes due either to lumps or a fluffy part which oxidized quickly - The perfection of the ingot can easily as well as homogeneity be seen by the oxidization test,

Now in same mould rough not ~~shiny~~ ~~—~~ brittle but not much more than Reg. bamboo oxidizes not to a point but to a frame work with holes all through like a sponge -

In the 2nd mould was
No 2. This appeared to
shrink much more than the
~~others~~. I should say shrunk
in length 1/2 - They are
shiny but would be
brilliantly shining if the
fine charcoal didnt stick
perhaps the charcoal should
be 50 mesh not less than
40 or more than 60 with no
dust. - They are very tough
bend almost to a knot &
its difficult to get grip
enough in fingers to break
them by pulling - They
oxidize to a minute point as
fine as silk & show great
homegeniousness -

The original length was about 3 1/2 & they shrunk to about 1 3/4 -.
They original die was I think from an 008. The Carbons are 3 3/4/1000 -

No 11. is dull and shows bad places not swells but sharp lumps sticking out as if Lampblack was not well mixed - It oxidizes rather Easy & not Even although goes to a point but very bad point being full holes =

Onchepumps

No 1 is exceedingly Even when lighted up - They are same length as regular Carbons not having contracted as much as No 2 - 1 in the dark and at the dullest red show no spots whatever - best I ever saw in this respect, They light up without peg on 120 volts but after working they dont seem to light up as bright as before wkg when no peg in - apparantly they go up in Resistance. No 2 seems to act this way also. - 1 arc

No 7 - 20 higher Res than No 1 -

No 7 - 1 no spots No 7 - 2 bad spot 1/2 inch inside from clamp -

No 3 no spots No 7 - 4.45 do No 7 no ho not spots -

No 2 beautifully Even at low
red - 2 arcd - + 1 pump didnt
work = we didnt dare to work
too high for fear arcing -
The Vac was not last + goes well
by + save the 2 arcd Carbons
as they are probably uninjured

~~Carbons~~ Squirt new fils (June 10 1891

No 13 4 Carbut 2 trichlorophenol with Mal. ground down until Mal all gone, then there appears to be an oily substance which causes stuff not to adhere to ~~[illegible]~~ mortar I notice that if solvent is put in raw Carbut only ground a little the lumps never come out no matter how much you grind where if you add Mal alone and grind until dead dry all the lumps go out then the aglutinating doses can be added to it, (No 13) kneeds well, The ingot was not very stiff as it takes a long time to get it hard — 20/1000 die, The filaments were not very shiny only one now & then could see lumps of raw untouched by solvent, apparantly — but was broken open by die Exposing the red tinge of the original; Trichlophenol seems to be non Lubricating on the die & without something else mixed with it will be hard to use in smaller dies = There are many specs — when these specs strikes side of die it spoils the fits for long distance by dragging —

No 14 —

June 10 91

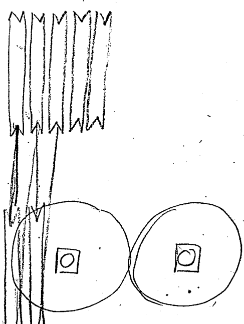
Reg highly purified, was afterwards
Extra purified by hot Mal, then while still
moist, ground dry in mortar. This makes it very
fine and practically free of grit, [illegible].
NO 14 is 2 gms Carbut. 1 grm Trichlorophenol.
with Mal, it was ground till Mal all gone &
Oil came to lubricate Mortar, Pugged it to the
right consistency in mortar by pestle &
rolled it up in fingers — didnt use plumbago
Die 20/1000 — worked well but came out
very rough Trichlphnl is evidently not
a lubricator, perhaps a higher percentage
would make it shiny or ingot not so
stiff. Present ingot might have worked
OK if I hadnt made it so stiff
Stiffness was not more & I think even
less than Regular —

June 10 '91

No 15

2 grms Carbut, 1 grm Trichlorophenal Chloro. This works well, (Carbut is XX purified-groundwet,) very sticky in mortar but gradually comes to an ingot afterwards it must be kneded 5 @ 8 minutes in hand (or pugd ?) it doesnt dry fast on surface at all + gives plenty of time for kneeding. Die 20/1000 - it squirts perfect, the surface is pretty shiny but I notice waves 1/64 @ 1/32 apart & all the fibres dia pbly increased 10 @ 15 pct at high swells. We stuck somewhat to glass rod - The ingot should have been stiffer or there was too much Trichlphl - I find after putting in box they stuck together somewhat. took them out + then dried them seperate dont think I injured them very much = I find on dry 1/2 hour fils colapse

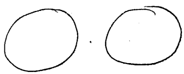
pbly to viscous not hard nuff

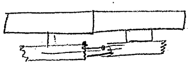


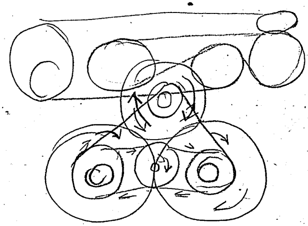
June 10 91

No 16 is like No 2 but 20/1000 die
2 gms Carbut. 1/2 gm Cam-Chloro ingot.
works well. (XX ground wet mol) best way after it
dry nuff pug it in mortar. ingot used.
rather stiff not very viscous; squirts perfect
(Shiny) fils broke of their own weight
so had to hold glass rod 6 @ 8 inches
from die. not sticky — fits dead round
dont stick to glass rod

No 17. (XX pfd ground wel)
20/1000 die — 2 grms Carbut, 1 gram
Cam-Chloro — (plenty Chloro) works
beautifully in die Tougher than 16.
Shine is perfectly satisfactory.
ingot pugged in mortar. tend to
dry about like No 16 — fits dead
round. dont stick to glass rod







No 18.

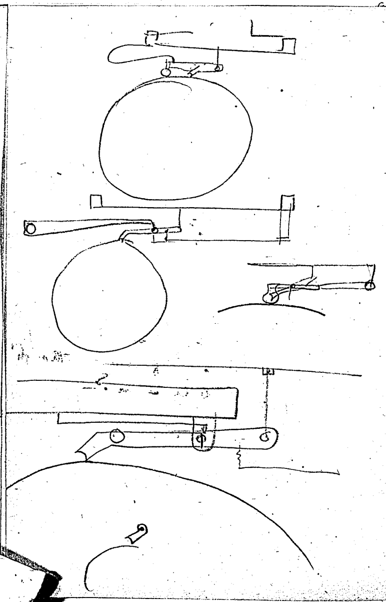
(XX pfd wet) 2 grms C 2 grms Cam – Chloro. Long ~~time~~ to pug fils beautifully shiny but I think I did not pug it long enough, nearly all the fils stuck to glass rod together, managed to get 3 or 4 for ~~test~~. Evidently equal quantities too much Cam, still extra pugging may do it, S —

No 19. (XX pfd wet mal)

3 grms C – & Chloro only. Easily pugged but must be got to die quick ingot rather hard & surface somewhat dry before ~~getting to~~ mould — Brittle fil, had to hold glass rod right up to die, shrunk greatly after getting on glass – not least sticky, shiny but not so shiny as 16 17 & 18, but nice. Notice after few minutes fils draws in & all will pbly go 6 ad

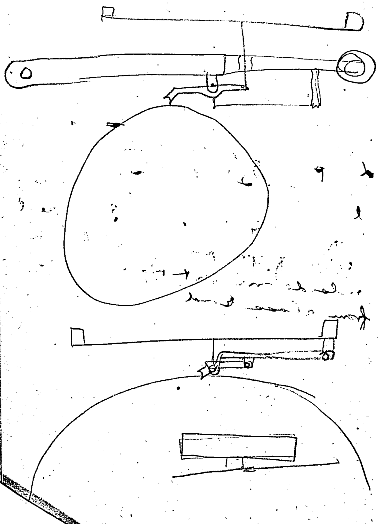
No 20 (XX ground wet)

2 grms C. 1 grm Thymol, – chloro-
grinds well takes long time to pug
& is unobjectionable & practical,
stiff ing at, yet could have been
made very much stiffer & wk OK
Die 20/1000 – works perfect in die
tough – sticks to rod slightly
so had to squirt slow
yet all were saved by
pugging a little more would have
been perfect, – It has the most
brilliant shine of all from
12 to 19 – Exquisite
~~Dont Contract~~ like 19 – think there
is some solvent action

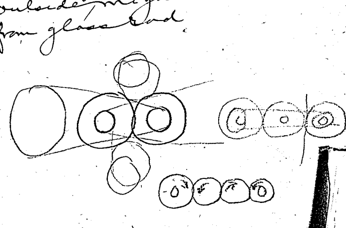


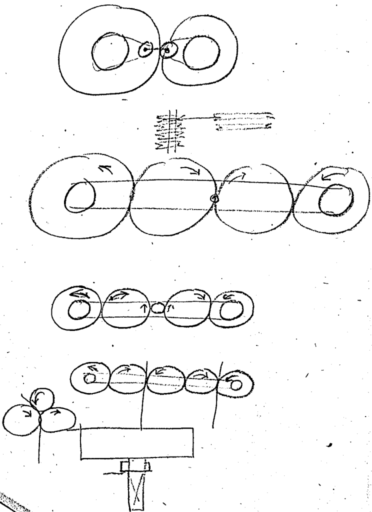
No 21 . XX ground wet.

2 grms C - 1 grm Menthol, chloro
sticky takes long time to pug as it
sticks in spots to mortar when
pugging - even when quite hard
~~still~~ its easy & ingot dont dry
quick die 20/1000 die
squirts Elegantly. tough -
~~not sticky~~ at all on glass rod
dead round Beautifully shiny
They seem to swell less than any
other when put in flame although
this may be a delusion. S—



No 22 -
Same as 21. Except .005
die, works fairly well although
die slopped up 1/2 doz times
from dried lumps in pugging perhaps?
pugging must be done with great
care so as to prevent ~~semi~~ dry
lumps - fit very shiny -
round but I notice several
diameters pbly due to hard &
soft ingot material? a great
deal of graphite catches in
outside might have come
from glass rod





June 11, 91

We now commence carbonizing

Mould 1

Bottom No 15 — ok

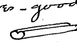
next 17 — stuck together somewhat and a little brittle.

No 18 3rd from bottom, very brittle and distorted only got 3 or 4 | in.

No 20 stuck together slightly not troublesome though — not cracked but good — extra perfect, — Top mould —

Mould No 2

No 21 — good — slight stick perfect bottom,

No 22 005 fibres — good some of them thus 

will run in prelim — 1 deg fahr per minute

Nos 19 + 16 all cracked 15 all shrunk — 14 Rough & shrunk 13 all shrunk

Result of Carbzn =

No 15 — Shrunk, irregular, warty — ng only 4 good — Contraction not ~~so~~ so much as 17. — showed say they were ng

No 17 — only one broken, contracted the most by far off all those Carbzd — round good — diameter very much diminished compared with others.

No 18. Shrunk warty — ng — brittle.

No 20 — Warty. only got 4 — not shiny like 17. — Larger diameter.

No 21 — all broken — most fibres ~~good & round~~ — charc stuck found crack or 2 pbly the cause of brittleness noticed in all

The .005 No 22 - only got 1/2 doz
out of 20 or 30 very brittle not contracted
very much in dia or length not
near as much as 17-

Camphor — melted = dissolves perceptibly
Cbt — Very sublimeable — nearly all
sublimes I dont crystalize — but gives
glassy coat Cbt, where thin

Chl Hyd — Dont appear sublime
dissolves perceptibly — on cooling
dont give Cabnt film — where thick
all crystals but after a while
when spread out thin — sticky
viscous — good dissolve

Anthracene — seems to dissolve
more sublimeable than Camphor
probably good — Leaves sometimes
very thin film Carbnt

Chloralalcoholat — Low mp
dont sublime good solvent
of Cbnt — Crystalizes after cool
crystals tinted with Cbnt.
no film — I doubt if this is good

Chloranil = High MP Exceedingly sublimable - scarcely able to melt it - It dissolves Cbut perfectly to black shiny scale - hard - this would seem to be perfection.

Benzanilid - Melts mod Easy sparingly sublimeable - dissolves little Cbut, crystalizes strongly on cooling no film - seems to run globularly.

Dibromoanthracene.
High MP - no signs dissolving slightly crystaline on cooling this might be good stuff to adulterate etc -

Nitrobenzaldehyde (meta)
Low MP – not sublimable – good
solvent when very liquid & hot
of Carbut, often pouring on butter
dish & while nearly cool its
viscous but when rubbed with
finger solidifies to non viscous
friable dull —

Sulpho-Carbanilid —
not Sublimeable – Mod high MP.
good Elegant solvent – dries
H_2O – Seems to be same chem
action – dries to ~~perfect shine~~
viscous pby OK if sublime ability
is unnecessary Dont Crystallize

Anthrachinon Sublimes very much before melting but finally melts at very high temperature seems to have no solvent action on Cbut but perhaps throwing in Cbut chilled it no film – this is good if mere subliming is required

---

Terpin Hydrate 1/2 to 1/3 as sublimable as Camphor Rather high MP – perfect solvent gives beautiful shine but after drying crystalyzes to dull color pbly because of excess of hydrate. this stuff may be as good a Camphor.

Betol (Naphtalol)
Melting point moderate –
dissolves (but perfectly
dont appear crystalize
viscous after cooling
dont sublime would be good
to dissolve at high temperatures

Napthalamin – M.P. low – very
slightly + slowly sublimeable
appears to dissolve (but good
after cooling solution thin
~~& shiny~~ acts curious but
after long while loses shine
& actions [illegible] crystals

Di-Resorcin — Very high MP —
It changes from white powder to wet looking stuff very little liquid comes out 85% dont melt. sublimes slowly think it scarcely dissolves any Carbonate though it may — by expelling I learn Carbut partly decomp before Di Resorcin melts. — This is abnormal
Salt for Expulg on Subliming

Aloin ng Sticky pulls out threads

Diphenylamin — fair dissolving on cooling actinolite Crystal.
sublimes slightly —

Pyridin Sulphate absolutely insoluble ng

Carbazol - MP high sublimes before melting seems to dissolve but slightly = very sublimable.

Thymol MP Low - very slight sublimable. good solvent, in fact Extra good - thin after cooling If Thymol used small quantity goes great ways when you throw in. but spreads, + dissolves itself without stirring not viscous.

Menthol.. MP very low - not so good solvent as Thymol not viscous ~~had~~ to be stirred still its good solut. not very sublimable

Hydrochinon – MP high –
Seems melt as of water Crystalization
think it dissolves some but,
sublimes quite rapidly.
Chills instantly when poured
surface not shiny dont stick to
dish.

Ammonia Formiate –
absolutely Insoluable

Ammonia Sulpho Cyanate
Absolutely Insol

Acid Phtalic, sublimes
readily – seems to dissolve
fairly – mod high M.P.
Chills quick – dull –
Crystalizes slightly.

Phenalphtholein —

Exceedingly High MP.

dont appear dissolve any — not sublimable.

Camphor MonoBromat.

Low MP — pretty good dissolve. non — sublimable

Aniline Chloral. High MP — difficult get any liquid sublimes readily

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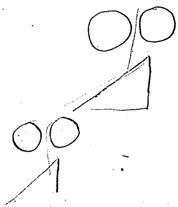
Quinidine — Very high MP

Semidissolve at very high temp

not sublimable



Methyloxide Oxalic
Mad MP Cbt acts queer.
dont appear dissolves in liquid
yet it melts & globulates,
drawn in thread etc funny

Turpentine Oil Dehydrochlorat
Low MP dont appear dissolve
on tray just enuff to Color it

Monochlorhydrate same as
above

Phenanthrene — Mad low MP
dissolves but somewhat
Crystaline

Oxamide — Doesnt Melt, at all,
Even on nickel Slip in flame:
but silently goes away without
smoke until all gone —

Trichlorophenol Low MP
of our dissolve — Cools
instantly - Crystalizes admirably

Ingots.

Regular dose chloro
is – ~~cc~~ 10 grammes or
2 on right side Druggist glass

23 – 2 grm C – 1 Cam. 2 drops
pydn with reg dose Chloro

24 2 grms C. 1 Cam 5 drops
pydn to reg dose Chloro

25 – 2 grms C.. ~~1250~~ 1300 milgm Camp
Reg Chloro (~~[illegible]~~

26 – 2 grms C 1 grm Cam – 10 drop Pyridi
~~[illegible]~~
pug hard reg dose Chloro –

27. 2 gms C – 1 Cam 250 milgm
Sulphur Reg Chloro..
note. (I forgot the Camphor)

28. 2 gm C — 1 gm Cam, 250 milgm
Iodine — Req Chloro.

on pugging —

29 — 2. gm C — ~~1 Cam~~ Req Chloro
pugged through 1 gram anthracene
+ 5 drops pyridine —

2. grm C — 1 grm Chloranil — 5 drops pyridine — chloro
30 ditto ~~pugged as hard as dove~~

31 — Methyl Cl with 20 drops
pyridine, 2 gm C no chloro or
Camphor

32 – 2 gm C. 1 Carr – ~~250~~ 300 mlgm
photo p890 Req Chloro, 5 drops pyridine

33. – 2 gm Carb ~~1 gm Anthracene~~,
~~Req dose Chloro~~ twice Req dose
Chloro saturated with Anthracene
10 drops pyridine

34 2 gm ~~Chloranil~~ C but. 1 gm
Chloranil – Req Chloro

35 2 gms C but. 1/2 gm
Chloranil – Req Chloro
5 drops pyridine –

36. 2 gms C – 250 mg
Sulpho-Carbanilid – Reg Chloro

37. 2 gms C 500 mg
Sulpho Carbanilid – Reg Chloro

38 2 grms C 1 grm
Sulpho Carbanilid Reg Chloro

39. 2 gms C – 1 grm Anthrachinon
Reg Chloro –

40 – 2 gms C ~~Terpin hydrate~~
250 mg – Terpin Hydrate.
Reg Chloro — not sol in
Chloro — must try other
solvents –

41 - 2 gms C - 500 mg - Terpinhydrate
Reg Chloro -

42 - 2 gms C 1 grm Terpinhydrate,

43 2 grm C 250 mg - Betol,
Reg Chloro

44 2 gms C 500 mg Betol.
Reg Chloro.

44 - 2 gms C - 750. Betal,
Reg Chloro

45 - 2 gms C 1 grm Betal
Reg chloro

46 2 grms C 1 gm Di Resorcin
Req Chloro.

47. 2 grm C. 1 grm Carbazol.
Req Chloro

48 - 2 grms C. 1 gm Acid Phtalic
Req Chloro

49 - 2 grms C 1 gm Quinidine
Req Chloro

50 2 grms C - 1 gm Oxamide -
Req Chloro -

51. 2 gms C 1 gm Campha 1 gm Oxamide
Req chloro.

51 $\frac{1}{2}$ = 2 gms - Falberg HCl - part sol Methyl.
1 grm Camphor. 5 drops pyrid.ii - Methyl
alcohol solvent =

52 - 1 $\frac{1}{2}$ g Cbut 1 $\frac{1}{2}$ gm residue
after Exhaustion by Methyl of Falberg
Native, chloro - + perhaps Mal -

53. ~~2 grms Falberg sol in Mal.~~
~~1 grm Campho Chloro Req~~ -

54 = 2 grms Cbut. 1 gm. Meta-
Chloral ~~hy~~ Req Chloro - how abt.
solvents?

55 - 2 grms Cbut. ½ grm Campha
½ Metachloral = Req Chloro

56 = 2 gr C. 1 gr Monochlorohydrate
Turpentine oil

on. 11th June we put. 75 grms syn— powdered 150 mesh in flat round— glass dish — with 3 doses of 200 cc each, of mixed acid + water Equal parts —. This is ~~at~~ the rate of 24 grms Sy to 100 cc acid + 100 cc water —

Each dish had same — very little puffing or nitrous fumes; reaction went on quietly — had to stir it well at first to get Sy wet, afterwards only stirred it 2 or 3 times, on the 15th pm we poured the three dishes in 6 times their bulk of water from hydrant in glass jar — will allow it to soak for hour and then filter off — ground in agate mortar and resoak in fresh water ~~[illegible]~~ ground & — put in water. June 16 — 5 am after grinding — (note, I find particles have not stuck together but are still about same size as original 150 mesh

over

7

on the 20th June final filtered the whole - dumped the whole 3 jars on the 15th into water, after soaking day filtered, ground, it slightly in Martar & put in fresh water, stayed 2 days, then filtered & put in fresh water 1. day then filtered The jar water was 10 dia. 12 deep - used our hydrant water -

The resultant stuff doesnt have the fine yellow of old stuff but darker & greenish - dissolves better in Chloro & about as well in pick -
not very much comes off with methyl not 1/4 as much as with old reg - Benzol gave practically nothing with old reg while it gives very considerable with new stuff & the stuff dissolved out by Benzol doesnt puff in the least in fact the stuff before purification scarcely puffs any = There is very considerable ash in Benzol residue but perhaps not more than in rest. It must be purified by Absolute methyl = however =.

No 23 = Think there was too much methyl left in it from grinding - I also suspect that the wood alcohol got down stairs tonight is common wood spirit full of pyroligneous acid I used a little of it and find that notwithstanding its exceedingly fine carbut. It will not dry on an evaporating dish constantly stirred for $1\frac{1}{2}$ hours - There was strong alcohol (methyl) fumes came off at first but afterwards It gave continuously repulsive acid fume smelt in pyroligneous spirit. I concluded to wash it out by Ethyl alcohol which I am now doing - The filtrate (Ethyl) is just ~~tinted~~ yellow - I think I smell a sulphurous acid as it smells & makes me cough as sulphurous acid.
No 23. with 10 grms Chloro is too much Chloro - 7 grms is plenty so I am going to change it from 10 to 7.

I found that when I had got an ingot that the repulsive smell of Methyl overcame the pyridin & chloroform It pugged beautifully in water & didnt stick once - I think I noticed some liquid squeezed out - however I am quite sure the Woodspirit prevented the sticking to water - hence sticking to mortar is a good sign - on squirting the filament was wavy also the skin was broken at points, & it was not good - the filaments all stuck to glass any way - I am going to try 23 over again as soon as Ethyl residue is ok. Dick is distilling some Methyl. I find that owing to the fineness of the material ~~that the~~ Ethyl takes a long time to filter - over 1½ hours & then

I am Campelled to lay open the filter paper while very moist with Ethyl to dry it =
It dries nice and yellow without Lumps but it tastes still acid — I am afraid that while it appears dry there will be some water left in it as Ethyl is only 95% — however by time this too can be dried out = I find that Exhausting with Ethel clears out the acid liquid hence it is best after working with Methyl. to finally Exhaust with Ethyl.
The material is good & practically free from Lumps =

Again I try 23' – 2 gm C 1 grm Cam 2 drops pyridine – 1 3/4 on left Druggist glass Chloro pugged hard until outside dries rather rapidly works beautifully

in die – fils – very shiny and round
& even size notice frequent Lumps
but not enough to lose more than 15%
of fils – If you squirt too fast
there is tendency stick to glass
rod but by going slow they dont
stick – hang up tube when full
to permit them to dry – made
3 tubes full = on taking off
stick they dont stick – nearly every
one saved – very little loss will
occur with this formula =
we put one tube full in Cbzy
box & save the other two for
future Expmt = 008 die –
went in No 1 ~~box~~ side of box – Carbons
are – 0045 – fils 007

No 24 = 2 gm C 1 Cam –
5 drops pyridine – ground well
after about 2 ~~[illegible]~~ notches
on Druggist glass chloro –
ground it to free it from
Lumps which was very [illegible]
didnt use any dry sides on

mortar = on hand pugged little..
afterwards pugged very hard in mortar
It pugs well & Easy — Squirted
perfectly = scarcely any loss, very
round and Even & very shiny
little more than 23 — dont stick to
glass rod as we squirted slowly.
we put one tube full in box ~~[illegible]~~
which is single box the loops being
placed at opposite Ends 24 & 23
No 24 is on No 4 side of a box-
008 dia — Carbon 005. 0075 - fil -
original length $5\frac{1}{2}$ — Carbon $4\frac{1}{4}$ —

No 25 - 2 gm C. 1300 milgm Cam
Scant. 2 Deg Chloro' = doesnt dissolve
well cant by any amount of working
get the Lumps out. worked long time
afterward took ~~ou~~ Balled ingot
together rather wet & worked long
time in fingers afterward
pugged - stuck persistently to
mortar but after while got it
reasonably stiff = hard to
roll the ingot with pestle so

as to get it in the die - it cracked
in putting it in 1/2 broke off &
was lost still we got a large
quantity good filments it works
well get 80 pct pbly but it doesnt
work so nice as 23 or 24 —
I think it sticks to glass but am
not sure 008 die — fits very
round Very few Lumps —
Shiny but as I am now using
Electric instead daylight cant
say if they are as shiny as 24
but think not — but naturally
they are beautiful = 25 to on
No 1 side of box — Carbons 004 . fils 0065

27 — ~~Sol~~ 2 gm C [illegible] 250
Milgm Sulphur but only part this
dissolved — I forgot to put in the
Camphor = Dies worked fairly but
stuck 2 or 3 times fils not shiny
some colapsed inward — not a
success I should say but perhaps
would have been better if
Camphor was put in
No 10 of box Carbon 0035
fils 006

26 = 2 grm C 1 grm Camphor
10 drops pyridin scant 2 deg on
Drugst glass Chloro =
Takes long times finger pug after
Took 15 minute to pug hand in
Motor - no fear drying - can pug as
hard as you please - This was
pugged rather hard yet it was
mobile - outside ingot when put in
mould was not dried or cracked -
This Combination admits of perfect
ingots being made & pbly by
machinery - It would be satisfacty
if filaments work in Lamp
The bulk of ingot is much smaller
than when no pyridin used -
hence pbly more Carbon in fil -
008 die - It worked the finest
in die of any we have ever tried
not a miss or bad fil - didnt
stick to glass - Dead round
Extra shiny & perfect no
Lumps or fractures noticed
occupies No 3 of 60X · Carbon 005
fils 008

32- 2 C 1 gm Cam 5 drops
pyridin - Chloro's = ~~XX~~ 300 mlgms
photo plumbago, didnt get all lumps
out. needed about 10 drops pydn
although it is fair, ground the pbgo
in with dry Cbut, then added
Solution - It pugged well in fingers
Couple minutes then pugged it say
7 or 8 minutes in Mortar - work
fine for pugging didnt stick -
008 die works well in dies -
dont stick to rod in slightest.
Dead rounds, notice lumps Cbut
not touched with solution +
also Effect of pbgo is to give
a broken surface shine with
pieces - ~~It~~ fils are good but
not perfect like Reg 2 C 1 Cam
10 drop ~~pdin~~ - at 5 in boxes.
Carbons 0045 fils 0075

32 1/2 = 1 grm Cbut. 1/2 grm Camphor
1 grm photographers pbgo 10 drops
pyridin - grinds well - mixed pbgo
with dry Cbut = put plenty Chloro
got clear dissolve = pugged same
time in fingers and long time in
mortar say 15 minutes - got it moderately
hard. always tendency to stick to
mortar Even at the end = think
Excess of prydin in proportion to Cbut
made it so should have been 5 drops
to the 1 gram Carbut, works well
in die - no stick on glass rod)
so twas difficult to hang them had
to use an Extra rod to guide
them = didnt stick got all -
.008 die = Dead round but
surface Rough. although the
filament seems to be ok =
put in No. 6. of box - Carbons .006
fils .0075

33 — 2 grm C — N/Kg Anthracene is
not soluble Enough to get 1 grm in
the Chloro — so took twice amount
(1c) 4 Dia on Druggist glass & saturated
it with Anthracene, filtered, put
10 drops pyridin in = Work OK
plugs well, 008, fils not
round O oval rough on
surface — looks as if Anthracene
Crystalized when pugging & thus
acted as inert powder which
always causes rough surface,
in No 9. of 6 ox. Carbon 004
fils 006

34 2 gm C – 4 div of Drug measure of saturated solution of Chloranil in Chloroform – couldnt get 1 gram in or 1/3rd that. used no pyridin, hence twas somewhat Lumpy – pugged beautifully in Mortar, .008. die work fine in die, fils generally round – but the surface is a broken shine or rather Lumpy shine microscopic = fils tough, the Chloranil Evidently Crystalize out & act as an inert powder to roughen fil = It certainly acts as a solvent otherwise I could not have pugged it so long or so well. didnt stick to glass, saved nearly all fils – in No 16 of 60x. (Stuck together) after Cbzn

36 – 2 grm Cbt – 4 Dw Drug measure of saturated solution of Sulpho Carbanilid = not Lumpy pugged beautifully = .008 die squirted good slapped only twice = fils Round & oval, 1/2 & 1/2 = Rough shiny In No 15 of 60x = Stuck in Canby

45 = 2 grms Cbut. 1 gram Betol – 2 Dw of Chloro – pugs good – sticks mould nearly to last then good drys quick – .008 die squirts beautifully – Theres ~~tendency~~ to stick to Rod – run slow then OK Could have pugged it a little harder I think

-38-)

filaments Round shiny -
pretty near as shiny as best
but not quite — '<u>Tough</u> —
think toughest we have
had — No 11 in Box.
didnt lose any fil = Stuck in Carbz
beautiful fibres

51 $\frac{1}{2}$ = No 13 in box = works ok in
motor plugs well - squirts
easy 008 - fils rough
Looked ok under micro in original box
carbon 006 fils 008

53. = ~~2~~ is the same as No 26
but is squirted with a 005
die = works beautiful stuck
once or twice - fils had
occasionally kinks say 10 pct
stuck little to rod could easy
make 100 a minute = perfect shape
round = No 7 in box -
carbons 003 fils 00525
origlength $5\frac{1}{2}$ — carbons 3 inches — <u>Over</u>

These were all preliminaryed for to 630 deg-fahr for 8 hours and run to maximum heat of gas muffle furnace in 7 hours

most all the fils were fused together Except the pbgo & the 005 fils - get record from Joe & also oxidyze them & report

56 — 2 grms C. 2 Dw Chloro —
40 drops pyridin = nice disolve no lumps worked it down by blowing afterwards balled it & pugged 10 mins in hand - rather sticky - but got ok then pugged long time in mortar say 15 minutes till got hard ingot, could have got it even harder if necessary as it squirted beautifully got every one only one kink noticed, ~~fils~~ fil, didnt stick in slightest to rod all the fibres look well on rod and after 10 minutes dont Curl or appear to shrink uneven under Microscope they appear dead round but the shine is, not Equal to Camphor fils — but very good & sufficient, Think there will have more Carbon left than with Cam —

57

57 = [illegible] 57. = [illegible] about .25
Falberg - but there is some doubt of it
is known as I have two proportions under
same No = 1st is 1½ Falberg, Ethyl,
20 dps Furfurol, to long time pug down to
ingot. stix to glass rod, works fictionary -
in die had change from 005 to 008,
then it kinked, want fibres I think
only get few - or its is the following
if there are many fibres then it is as
follows - 57 - 1 Carbut, 1 Falberg
200 mg Camphor, 20 drops dipi little
Mal, Chloro - [illegible]

58. 2 Cbut, 300 milg Camphor 40
drops dipi, Chloro 005 die
Takes long time to pug works
Elegant in die pugged it quite
hard but there is a tendency
to stick to glass rod, to mortar but didnt stick think
there is an unnecessary amount
of pyridin used fils are dead
round & generally free flaws
surface not a dead shine

59 2 Cbut, 200 milgms Cam
40 drops pyridin Chloro soaked
it 10 minutes & then squeezed it.
took long while acted like 58.
works well in die stuck 3
times fils round but dullish
not shiny appears rather
free defects

No 60 2 Cbut, 500 milgms
Camphor. 20 drops pyridin
plugs well dont require so
long a time as 59 — & harder,
in gat. (squirts fairly die
stopped 4 times but last run
got 1/2 of whole output without
stopping fils shiny showing
Camphor lubricates — dead round
& rather free flaws stix to glass
rod somewhat, but afterwards ok
Could have plugged harder safely
.005 die I think —

61 — 2 Cbut 500 milgms
Chloral Hydrate, 20 drops
Pyridin — Chloro-squirt ~~well~~ fair only
plugs well — stopped once in
die = fibres round & rather
free spots fairly shiny
.005 dia I think —

Nos 56 to 61 & also Nos of
the previous fils left over —
the hung in glass rods in preheated
furnace and in 5 hours brot to
350 deg. They contracted about
1/2 inch — then put back
& run to 630 in 5 hours
they contracted about inch or
$1\frac{1}{4}$ — but the great contraction
did not take place hence it
must be the critical point is
around just below red heat, we now
put them in nickel 60 xes, on the
22nd I am to run them to final in
gas muffle furnace —

Sept 27/92

Some experiments mixing various things with Syrian asph hot melted, then pouring in a slab & putting into a steam jacketted press while cold & squirted. — then the (.005 die) fils are put in Kerosene with 1 2 3 + 4 cc of Chloride sulphur respectively & allowed to soak. After a time pieces are to be taken out & carbonized to see how far Chlorination has gone in —

No 1 Bright fracture Syrian melted with unboiled Linseed oil in considerable quantity Clear ingot, not gassy or puffy very little gas came off — poured on cold brass plate Cut strips with shears & rolled them up & put in press — fils perfect under Micro- no lumps or defects — very electrical may have trouble to handle — tough fil used 1 cc Chloride Sulphur in the 3 oz bottle of Kerosene —

No 2 do 2 cc Chl S
No 3 " 3 " "
No 4 " 4 " "

over

Sept 27/92

No 5 is the same as No 1 but with very considerable amount of asphalt added so as to diminish the quantity of boiled linseed, makes shiny break fil perfect pbly cured use still less oil, not so electrical as No 1 — tough — 1 cc Chl Sul

No 6 do 2 cc Chl Sulphur
No 7 " 3 " "
No 8 " 4 " "

No 9 Syrian very little unboiled linseed & lump of Camphor - rather spongy - dont give good break like 1 & 5 squirts beautifully fils perfect apparently - air or rather vapor of Camphor that makes it spongy probably condenses & hot pressure consolidates it ok -
1 cc Chl Sul
No 10 2 " "
No 11 3 "
No 12 = 4 " " "

TAE

No 13 – Syrian & Japan Wax – mixes elegantly – black fracture, not spongy very little seems to do big although considerable wax in this – Melt to thin liquid – works well in die – tough, files perfect.

1 cc Chl Sulphur

No. 14 2 cc "

No 15 3 cc "

No 16 4 cc "

Bottles put away

475
195
67
30

22
30

60
14
26
2

22
30

36
43

377
35
412

457
412
45

190
50
95

100
140
15
255
60
195

280
180
2240
280
5040
2

45
400
18000

675 wagons
67 Coal Bit
42 Pea
90 Rolls
24 bells
32 screens
20 Bolts
40 Crushers
16
280
2280
232
3248

25
3

45

75
27500

50

1010
50
1060

4000
74

453 —

450 —

5

500 —

650 —
81
45
85
20
881
90
20
30
24
60
1120

29
400
1161

50.
383
25
20
428
1120

480
457
428
29

23
3
69
81
383

4300
3360
9400
9460
4400

N-90-11-07

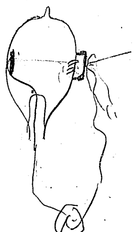
Notebook, N-91-09-03

This notebook covers the period September-October 1891. All entries are by Edison. The book contains notes and drawings regarding the "blue bulb" phenomenon and the reduction of mercury vapor in incandescent lamps. There are also notes on various filament experiments, including entries, numbered 1-19, relating to the deposition of carbon and other compounds on the filaments. Edison's notations indicate that he was often assisted by an experimenter named "Joe," possibly John Joseph Force. The spine is labeled "122." The book contains 187 numbered pages.

Blank pages not filmed: 178-185.

X E-172

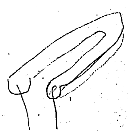
N-91-09-03

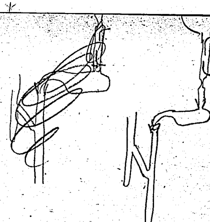


L
H
E
V
C

[illegible]

Manches



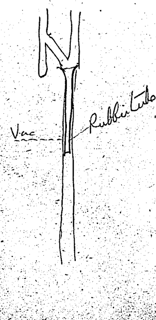


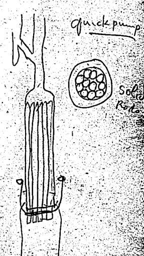
① Sept 3 91

deposit while getting Vac –

deposit silver on inside Exhaust Tube after Lamp sealed off & this absorb Hg = use Pt wire silver ten[illegible]

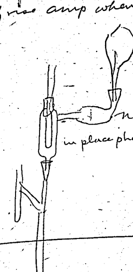
Sept 3/91





Sept 3/91

Dreshler put in maximum ampmeter & see if rise amp when lamp break —



no phos —

in place phos anhydride —

gold & other metallic leaf on carbon which vac bring fil up volatilize & the metal will in time absorb the ~~Hg~~ —

(5)

Sept 3/91

To ascertain if there is a God carrying short ckt after blue goes away also to ascertain if lowering of CP after running sont due to great energy due to the short ckts. Red Lamp then measure cold — then after its fallen to 50 pc of CP measure again cold.

Sept 3/91 — 430 AM —

Put gold Leaf 1/2 inch squa in Vac on glass where Vapor of Hg incandest struck it by burning Lamp & looking at blue by Spectroscope Hg Lines gradually disappeared & was able bring the Lamp higher than Ever a 16 cp 240 was ever brot before
Hurrah!!!!

Sept 3/91 ⑦

The ~~old was~~ reason the old way was a failure was that it was put in side tube with idea it would absorb Hg where it dont absorb cold Hg but being put on side of globe or in the path of the incandescent vapor the instant the Hg strikes the gold it combines because its [illegible] incandescent. –

Sept 3/91

putting 1/2 inch square of gold or Ag on side dont seem work well =

Sept 3/91

Phenomenon When gold leaf hangs to fil its repulsed from globe when lamp touched, but when piece touches glass & off filament heating glass attracts loose end to glass –

Sept 4/91

Hg-Exps

- Iodide Hg in Lamp =

Big Hard Sodium amalgam -

Tin foil -

Sept 4. 91

Keno. 32 = Silver inside — Hg not gone

Set up Req Curve -

Sept 4/91

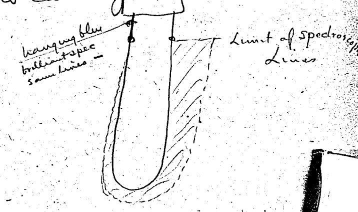
33 Keno — mz — side tube Iodide Ag got vac showed Hg — while on Vac heated side tube not red or to decompose gave off no air — then heated red decompose portion AgI — no air turned yellow or reddish — stopped Hg little sealed off with tube on then heated till turned blackish didnt knock Vac down = all lines disappear, globe clear — then sealed off side tube & sent it for test

Sept 4/91 (11)

Kerns 3# Mg Reg for Deshler to put on transformer ~~test~~ ~~but opposite~~ Leg =

Sept 4/91

The Lamp with Cu I – gave off air no 2 = Knock Vac down hanging blue ||||| spec – globe apparently clear but by moving spec close to Carbon got this



Sept 4-91 (13)

33 No 2 is a duplicate - acts just same -

Sept 4/91

Keno 34 - Bromide aurium

Lots other lines didnt heat - fairly Vac or light decomp'd it = globe clean blue on clamp - High Vac - no Hg Lines

Carbon not blackened -

Keno 35 - Chloride aurium

Lots other lines Lots air on heating fair Vac + globe blue no Hg Lines

(Carbon very slight blackened)

Keno 36 Chl aurium & Sodium

Lots other Lines - Mod Vac globe blue - no Hg Lines -

(Carbon - blackened 1 side)

Make Oehlers Transformer order

37 -

Sept 4/91

If getting rid of Hg Vapor prolongs life then best scheme is either Iodide silver just at tip & heat to red when tiping — or a supply of Bromide gold between phos & Lamp covered from light & when high Vac take off Cover & Expose to Light long enuff to give off free chlorine to Combine with whole of Hg — or a side tube blocked and sealed off with Lamp — & then Exposed to Light & sealed off — or small piece put in Lamp to keep Hg Constantly combined during Exhaustion & piece afterwards ~~got down~~ left in or got down in Exhaust tube & sealed off; There are many schemes to work it — practical —

Keno 1 w fibs heated to 600 + then thrown in Naptha –

Keno 2 Reg clamp material all the clamp painted all over + heated

Keno 3 Aluminum Electrodes

Keno 4 new clamp material, Chlorinated Balata Bengal + plumbago painted over clamps clear down to glass –

Keno 5 Heated fil. to 600 then thrown in Turpentine – then new clamp material all over clamps to glass –

Keno 6 – Bulb Coated inside with amyl acetate Sol of Collodion

14

6X

60

90

Keno 7 = Inside globe coated with Rubber dissolved in Chloroform

8. Balsam Fir (Canada) in Benzol inside globe Coated -

Keno 9 — globe cleaned with 25 pct solution HCl —

Keno 10 Cleaned hot 20 pct KO —

Keno 11 — Mg Carbons in Jena bulb

6 X 10 sec
7 X 15 "
8 X 20 "
9 X 25 —
10 X slow chgn =
11 X 3 inch Cock —

3 X 5 m.
Ed — [illegible] 8 sec

12 Kero Inside bulb Coated Rosin in Benzol -

13 Kero - Bulb cleaned by ammonia

get missing Kos -

Kero 26 Sectional Exhaustion by pinch Cock -

Kero 27 - same as 26 but with Little bulb -

Kero 28 fine Contraction in Exhaust tube -

Kero 29 Asbestos plug

30 Keno asbestos plug —

31 Keno Carbons heated then thrown in hot HCl —

31 Extra same as 31 but bulb washed in HCl —

other nos in 1st part book =

Keno 23 big tube no contraction no glue on either clamps very little air Gore 12/1000

22 Keno No phos used

21 Keno Run with phos like 22 —

Keno 20 japanned clamps
+ part of glass —

Keno 19 — new clamp material
in spots over filament.

Keno 18 — Long inside wires
japanned —

Keno 17 — Copper spiral on
N — side —

Keno 16 — japanned long
wires & glass — baked —

Sept 5/91

Keno 38 –
fits HCl. 10 hours –
cold + not previously heated –

Keno 39 –
~~Tuesday Monday~~ Tuesday
Sept 8 '91 –

fils soaked 5 hours in test tube
3 strx KO, then put in 1st distilled
water then soaked $1\frac{1}{2}$ hours
in 2nd distilled water.

Keno 40 – Glacial acetic
5 hours – $2\frac{1}{2}$ hours
in 2nd distilled – hard to wet
them =

Keno 41 -
SO_4 - soaked 5 hours
soaked 2nd Dist. 2 ½ hours

---

42 Keno - Soaked Nitric acid 8 hours -
in 2nd Dist 24 hours -

---

43 Keno - soaked 8 hours
in about 20 pct Hydriodic acid
in 2nd Dist 24 hours

---

44 Keno - 2 Slix KO. for 5 hours about
afterwards tube put in hot KO water
+ boiled about 2 hours until water
½ Evap + bubbles gone. then 10 hours
in 2nd Distilled -

35 - 33
3
105 - 99 -
20pct, 90

Since we have good Carbons why not burn lamps at 60 candles for 20 min & then set them up at get drop Cp at normal = Evidently we dont eliminate the excessive drop of Cp enough to prevent the 1st rapid drop at normal.

Try amalgamated copper clamps -

Try passing following in Emmons bulb after lamp worked Req -
HCl = Hydriodic acid, acetic acid,
Nitric acid, Bromohydride, ~~Chlo~~
Nitro Benzol, . ammonia, Hydrocyanic acid,
Sulphide Carbon, Chloroform,
Ethyl alcohol, Sulphide ammonia,
~~Nitro~~ phenol, Trichloroacetic acid,
Furfural, pyridin, Bromobenzol

Dip Carbons in following —

Carbut in pyridin —

Uric acid in tetraethylammonium —

Halberg Nat in Mal,

Keno 45 = SO_4 in water say 25%
put inside globe when ready
to Exhaust — Idea being make
globe acid — no curve ng

Keno 46 = Castor Oil in
Lamp — ng no curve

Keno 47 = Balsam Fir with
TetrachlCarbon in bottom
Exhaust tube —

Keno 48 — film soaked in Ammonia 24 hours & several hours in 2nd distilled —

Keno 49 — Lead acetate 24 hours several hours 2nd distilled.

Keno 50 Borax 24 hours 12 hours 2nd Distilled.

Keno 51 — 1 Lamp side tube fused Chl Cal big pin head $\frac{1}{4}$ this size Emanga — 1 drop SO_4 when jerked Lamp Reg - knocked CaCl into SO_4 — gave off HCl — no blue — lots gas came off for $1/2$ hour when not very bad frightened

Lamp this increased gas 3 fold
pbly moist - should pass through
phos anhy before going to Lamp
burnt fil tough in very bad Vac
yet not oxidized = ~~So~~ finally
with very large quantity air

Coming down seal'd off
blue in lamp showed
Hg + some strange Lines
plainly - also showed
Hg in genl. Vac although
no blue in genl Vac -

Keno 52 - 24 hours in
phosphoric acid - 20 hours
in 2nd dist ——

53 — fils 36 hours in strong Chloride Sulphur Then soaked in Kerosene 1 hour —

12 X - after fired quickly in Kerosene — 10 sec of 17 -

13 X Same moved not Kerosened

14 X Regular which F + H would like tests on -

15 X are such as they are sending to factory 10 sec of 17

16 X are discolored Carbons which they call oxidized -

~~54 Ken~~

53 Keno globes dipped in distilled water containing say 1 to 1/2 % of HCl Reg Mg

---

54 = Reg Mg - globe heated then HCl passed over thoroughly until damp - then cooled little by blowing in bulb - then reheated - + HCl passed again - blowed on - finger used on end exhaust tube then taken off & rubber put on quickly + then on pumps

---

Keno 55 = Heated bulb + stuck ends in ammonia bottle - claid till only little warm - put finger on + taken to pump room —

Keno 56. Clamps cleaned 1st HCl - 1/2 min then HNO_3 5 seconds then Red Solution, then plain water then distilled, but didnt wash whole length so glass got somewhat dirty by rinsing water running down

57 – Mg washbulbs –

58 Mg Washed bulbs heated globes after Exhaustion & before sealing –

59 – Mg washed – bulb heated & run as high as possible on pump –

60 – Mg Washed – peroxide Lead in side tube —

61 – Mg washed — SO4 in side tube & 3 pin head Ferrocyanide to make CO —. – 1st lamp broke ¼ inch fin p. clamp on pump making another –

(47)

62 — Mz washed — get Vac
plug in 120 volts at once

63 — Mz washed plug in
on 120 ~~bottom of the~~ 4th
peg down on Lamp bank
run 1/2 hour then thermk
Reg —

---

64 — Kino — Reg Mz
globe cleaned dried +
afterwards Wet with
strong Sol KOI

Keno 65 =
Boric acid in globe

Keno 66 = soaked about 3 days Chloride sulphur then 3 days Kerosene

Keno 67 Soaked about 4 or 5 days in distilled water taken out & heated on hot plate put back in water ~~Rebo...~~ ~~back in water~~ then out ~~& sent~~ to Joe —

51

Keno 68 = Uric acid inside tube —

Keno 69 — SO_4 + piece Zinc knocked over into SO_4 ~~to make H~~

Keno 70 — Mg Reg —
Sealed tube, then heat then in 15 min heat bulb again then after 25 minutes from sealed tube heat again then in 5 minutes Light up fit + wake
Reg —

Keno 71 = boiled for 1 to $1\frac{1}{2}$ hours in strong KO; soaked 1 hour in Distilled =

Keno 72 = deposited by Aylsworth,

Keno 73 - Oxalate Ferrous in side tube - heated to reduce to blue then got solid tubes worked Lamp & sealed off = on one I attempted to reheat when it broke vac - didnt use the Lamp

Keno 74 — 10 Mg Reg
Kept fil on minimum ~~time just enough~~ Each time to break tube,

---

Keno 75 = put Lamp on & then brought it up to yellow ~~red~~ heat for 2 seconds while there is no vacuum so as to Oxydize the filaments

---

Keno 76 = Oxidized by passing through Bunsen burner

57

77 Keno - abt a week in strong HCl = taken out soaked dist for 1/2 hour then Taken out dried sent to Joe.

Keno 78. - boiled in ordinary Nitric several hours - (put in Carbons Cold) then boiled for couple hours in fuming Nitric. (may be nitrous)

Keno 79 = Carbons Cold put in ~~Stone~~ SO_4 - heated over ~~water~~ Sand bath - for ~~say~~ 4 hours - soaked 1/4 hour water

Keno 80 Cold Carbons in
hot CyanideK - for 4 hours

Keno 81 - Cold Carbons in
hot Iodide K, for 4 hours

phenom - dont stick on taking out of water

Keno 82 - Cold Carbons in
hot Chl Zinc for 4 hours

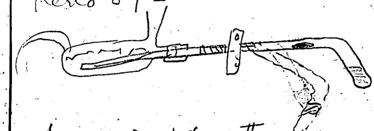
Keno 83 Cold Carbons in
Hot glacial phos acid
for 4 hours

Keno 84 = Cold Carbons in hot Ferrous Chloride for ———

Keno 85 = Cold Carbons in hot Hydriodic acid for ———

Keno 86 – Cold Carbon in hot Aqua Regia for ———

Keno 87 =



SO_4 inside tube with piece Ferrocyanide K by Tipping goes into SO_4 & make Hay after Lamp worked both clamps & bulb heated, Lamp not run very high say 30 @ 40 cp. after gas in = 10 in order.

Keno 88 — same tube arrangement same process only Cyanide Ag giving Cy residual. — 10 Lamps

---

first worked Lamp up Reg. then reversed poles — then got sealed then put in Cy by heating AgCy tube, then put in Cy by heating AgCy to 1/8 inch pin heads — then sealed tube ~~at~~ sealed off without lighting Lamp after Cy was in —

The one worked 3½ hrs
lamp clamp [illegible]

Sept. 14, 1891
was Monday
Sept. 16, 1891
was Wednesday
H.R.S.

Screen Experiment started
Monday at midnight 14/91
now Wednesday midnight
run continuous except
3 hours —

89 Keno 5 Lamps tube
got solid. then put 40
Lamps in series and cut
one at time out every 7
Seconds until 1st peg when
it was dull. red — (Had heated
bulb by Bunsen when solid
tube was obtained) then
worked Regular —

(67)

90 Keno Fluoride Sodium in SO4
side tube —
No 1 had blue on clamp cldn't
get off
No 2 no blue on clamp —
Couldn't get others off no there
was action on phos anhy

Keno 91 = cold Conc SO4
1 week then boil for
3 hours — then taken out
Uranium in water & immy
taken out dried & put
in box —

Keno 92 =
Drop SO_4 inside outside
bulb — Mg Carbon —

Keno 93 — Sodium amalgam
instead phos only worked bad
took long time — !

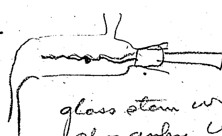
94 — Sodium — worked bad
vac in $1\frac{1}{2}$ @ 2 hours imperfect vac

95 — 90 deg Fah

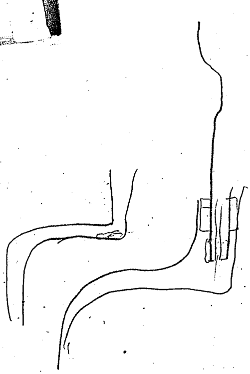
96 2nd Lamp sodium
only — wkd qker & better
than No 1 = vac in hour about
not perfect vac

97 – Sodium 3rd Lamp after Na had been in phos Cup all night = took about 50 minutes ~~got solid~~ tube = ~~didnt break~~ up very much when fil run up – I run it up to finish – 3 minutes I noticed ~~faint Lines~~ between Hg lines

98 –



glass stem with phos anhy wks quick & well –



Keno 99 —

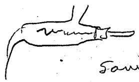
gas get heater

990 phos — works fairly
quick except on tail
end although it may
be OK as Re-working
gets salid tube quick
at 1st.

---

100 — 4th Lamp Sodium
in phos tube —

101



Same as 98

102 – ~~No 2 Lamp~~ second Lamp
heater –

104 – Worked by Edison Spoon
phos Cup – ~~[illegible]~~ 2nd run on the
phos – got solid tube – put in
plugs & run to full 120 volts
second by second along box in
30 seconds or less –
pulled peg & let run solid –
Then lighted each again on 120
for 10 seconds pulled peg then run ~~[illegible]~~

104 –
Baked then put on 200 volts
+ run right up to blue off
clamps + pulled peg + let run
solid, then lighted them at
say 140 volts for ~~5~~ minute
~~then~~ when found tubes solid
sealed off = noticed ~~[illegible]~~
Every one that as soon as blue
off clamps running little higher
the blue disappeared in globe
on all + comes back on lower
volts = Every one of 5 showed
this + this is new —
Notice on one leg of fil New clamp is dark
we put a paper spot on that side – which is side blue is on

Possibly I run these Lamps too high –

103 = New small phos Cup with
spoon – 5 Lamps MZ Run Reg
1st run on the phos – Joe reports no
blue appeared on clamps –

(79)

105 Reno —

Spoon phos Cup new-
phos M3 — pin head Hg in globe
worked up quick + minimum
time lamp on ~~to get~~ air out
plenty blue in globe — also
blue didnt go away like 104
blue in clamp went off not
quick like 104 but about
like Reg or little harder
Carbon shiny — Economy
157 against 164 of 104 —
although both M3 Carbons

$\frac{1}{0}$ Lamps 3 and 2 that ~~didnt~~ ~~me~~ lasted 30 hours
other 90 hours all
treated in 90 hours

Bogg reports lamps kept always
blue —

(81)

106 - worked on heater & case

107 Reg Mz m. 50 cp bulbs
noticed that where bulb was
annealed one of the lamps
showed a streak of dew
inside globe at greatest
diameter - The Meister was
so much that dew didn't
disappear until nearly
mm Vac - then the little
spoon of phos was all
wet & while the other 4
got sealed off & worked Reg time
with no blue or clump
the other lamp is still
on pump & there is no
end to our pkg due to H_2O
decomposing the wet phos
doesn't absorb H_2O

(83)

108 - 4 foot tube to diminish amount Hg Vapor —

109 - dipd Cb + dipichlo - not good dip but fair. 40 Lamp bank didnt give off scarcely any air pbly dipi absbd phos & chlf decomp Cl went to Hg C deposited — Arcd —

~~[illegible]~~ 110 Dip & better one of 109 —

K-111 - Run up to about 4 Candles in Municipal very slow per 10 sec found couldnt go higher sb had run reg spoiling Expmt

112 Reno - Run up on Municipal
& another 60x from nothing
to 50 @ 60 Cp - took about
3/4 hours no air except at
about 8 @ 10 C. when very fine
pin heads after that way up
scarcely the finest pin heads
showed - dont think I brot
it up so high as they do reg
as I was afraid would injure
Carbon on account time it
took - didnt have current
off but once for 5 sec at
8 @ 10 cp - Hg Vapor there
just same no blue appeared
at clamps - 10 s at 1st
then 15 then 1/2 minute
then went by pin heads
counted & if no pin heads in drawing
put batteries on & run 5 minutes

112 No 2 3 + 4 run same way
notice shade of blackening on blue
clamp side near clamp $\frac{1}{4}$ inch long
also notice glass of inside part
browned on blue clamp side = seems
to me all others have this brown on
n side glass — Saturday 330 went home
disgusted with incandescent lamps —

113 — 5 fils dipd Cb + dipichloro
old XXX —

114 = dip 17 — then Chl Sul in
Kero 1/2 hour then in Kero
then to Joe = Life 5324 hours
my Carbon —

115 = dip 17 then Chl Sul in
Kero — then in Kero alone out
dried then redip 17 then
Chl Sul in Kero. then in Kero
+ out —

Oct 11th 91

(89)

116 = Furnace Experiments

Amylene in Kerosene 25 minutes
whitish yellow - Carbon box
non tube - very little Lamp
black - These Carbons are
NC Carbon on top of Charcoal
nearest to where gas first strikes
+ had some hairs in part
have been brushed off by
Camel hair -

117 - Same as above but
further on on top Charcoal
towards Exit.

118 - ~~[illegible]~~ Same as above
but immersed in 16 mesh
Charcoal -

Reno 119 oct 11 91 (91)

2nd Run anyglass but

Which yellow 1 hour and

non Luminous flame - didnt

seem as silvery as other in fact

dont notice they are any more

silvery than Regular = full

hairs which brushed off

pretty near all - Charcoal

was not shining may be if

I put Lamp black in each time

+ lay Carbon on may do better

possibly Ox got in + Lamp blk

being sensitive saved Carbon

but Charcoal being once used

became insensitive

oct 11/91 (93)

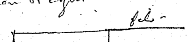
120 Run through City gas
didnt seem to brighten

121 - used iron side tube
heated by burner side
tube have ~~8~~ or 10 grams
Coal tar made them slightly
silvery —

122 - Napthalamine
this Looks ok

didnt whiten Carbons much but
had they been at ingress end would
have been bright.

propose

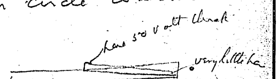


Oct 11 91

123 Napthaline = ~~ng~~ no deposit didnt send enuff through going try send large quantity through next time.

---

124 - It worked - but cbns stuck together. twas 50 volt thick on circle which was on top



Gave Joe some short legd ones to test full cp but think they will be dull on top —

Oct 11, 91

125 = Tar in Iron retort.

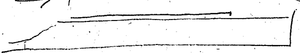
silvered them lovely didnt stick but shade - deposit very thin - wanted more time say 40 minutes next time -
5 set up now bkn oct 17 life 3304

126 - Same as above - but same stuff = not so good - 45 minute run -
4 set up 2 bkn 3304

127 = BS. Coustop charcoal

→ gas

greatest deposit here



good very silvery - fundamentals nearly obliterated for 1/2 Carbon at ~~End~~ Loop ~~furthest~~ from gas good but at tail very silvery but not so much deposit = had big retort, & was long time before Illuminating gas came then towards End gave 1 inch wide 3" long

Oct 11 98 TAE

Luminous flame - had this been
Kept up the deposit would have
been sufficient all over to eliminate
fundamentals - Evidently the 1/2
ones are either too high or they
retard gas - Raise Tails higher
~~&~~ if that dont do it spread fils
out in various directions ~~[illegible]~~ etc
find out trouble =

Oct 12 91 703

Deposit Expmts = Expmt 1

3 inch tube inside measurement.

Turnspout for carbons - Big retort BS.

Started 635 - with some little smoke
Coming out. at 652 the smoke lighted
at 655 - turned on more gasolene on retort,
flame is now 3/4 long $\frac{1}{4}$ inch of which is luminous
at 7 pm $1\frac{1}{4}$ long $\frac{1}{2}$" luminous - Big tube yellow
702 flame 2" long $1\frac{1}{4}$ luminous jerky
turned down gasolene slight to prevent to much
flame & rapid deposit 704 3" flame nearly
all Luminous slight appearance lamp blk
at tip 710 still $2\frac{1}{2}$ @ 3" long slight LB
on tip 715 - considerable lamp black -
719 shut off - found Everything covered
with lamp black - this was done on the
start as no deposit showed on carbon
where they were bright - or circulation of
gas too slow + allowed ~~of~~ too rapid deposit

Expmt 2 Oct 12 91 7a

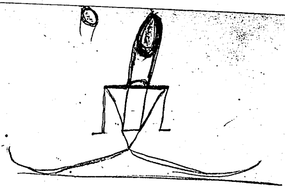
Same BS in retort but used about 1/2 oz Benzine to clean tube, there shouldn't have been but a gramme as it made too much gas for considerable time

Started heat right away & put burner under retort, flame appeared at exit at once

Started 830 -

Benzine vapor gave pulsating flame at intervals of 2 sec but when it was steady twas inch long at 8.34 tube dull red & benzine flame 3 inches long ~~yellow~~. 835 very large. Benzine flame bigger than gas jet & smoky 838 flame 1/2 size luminous & smoky 840 flame not smoky 1 1/2 long & luminous 842 Benzine flame gone BS flame came 843 2 inch long smoky & the yellow dust in carbon 850 big as a gas jet smoky pulsating turned off gas on retort at 853 when flame at exit died down to pin head & at 1" 858 shut off gas from big furnace

Carbons & holders all lamp black but signs of deposit - fluffy & hairs on short inside filament are in Expt



Expmt No 3 Oct 12. 91.

TAE

New dose BS in large retort, lighted retort about 1/2 size flame at 955, lighted gas in furnace at 957. - ~~[illegible]~~

958 - non inflammable air blowing through exit tube 10.1 tube dull red. raised flame in retort little, 10.4 tube Red - non inflam air from Exit at 10.4 raised flame on retort, 1007 - non luminous very fine flame at Exit - 10.19 tube yellow flame self supplying 3/4 long blue entirely non Luminous 10 11½ pm flame 3/4 blue non Luminous - raised it in puffs twice - jerky

1014 - 3/4 long shows signs of luminosity - Tube bright yellow - took top out center hole,

1016 - flame inch ½ long. semi Luminous not blue no signs of volatilized particles in Center of flame tube very bright yellow 1020 flame inch long non or semi luminous not blue, looks like Alcohol flame with slight amount Sodium - & or say as top of alcohol flame

1023 we little tip of luminosity in center of flame on Exit.

Oct 12 91 (107)

Tube whitish yellow 1026½ pm - Exit flame about same size - luminous tip in center about ⅛ inch long - raised heat on retort 10,30 flame 1½ long ½ inch luminous no Lampblack no solid dust,
1031 flame exit 2" 1¼" luminous
Tube bright yellow - I turned off little of gas on big furnace - 1032. turned gas way down on retort as Lampblack commenced to show - flame now dying down on, 1 inch - Luminous no Lampblack 1034 turned off gas on Retort, flame ¼ inch Luminous 1035 Exit flame gone - 1036 Shut gas off furnace -
No Lampblack anywhere Carbons very silvery - but deposit light some fine fluff on them but not to harm = Keno 128.

from lighting furnace

6 1/2 minutes blue flame appeared

7 minutes 1st appearance tiny
nonluminous flame —

9 minutes 3/4 inch pure blue

15 minutes flame not blue — Mauve

27 tiny tip of luminosity

31 minutes 2 long 1 1/4 of it luminous

32 3/4 luminous tendency lampblack

39 [illegible]

Expmt 4 —

Oct 12 91

~~Using same BS as in No 3.~~ Big retort,

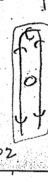
Put in a fresh dose of BS same amount
by guess as before = I am going to work it
as near Expmt 3 as can but continue it longer
to see if can get heavier deposit, also turn
turnspit more to stop fluffing —
Lighted retort 1/2 size flame at 11 23 pm —
noticed at 11 25 non inflammable air coming
from exit Lighted furnace at 11 26, + put tops on
11 27 non inflam gas exiting at 11 30 tube dull red
scarcely any if any gas from exit raised flame on
retort little — 11 31 1/2 spurty bluish flame at exit
11 32 1/2 raised flame on retort, now continuous
blue flame — 11 33 first appearance tiny
non luminous flame — 11 34 tube dull yellow
11 35 3/4 inch pure blue non lum flame
little spurty at times but continuous —
11 38 — flame 3/4 inch non lum blue, spurty —
when it spurts its still non luminous + about
1 1/2 inches long 11 40 tube yellow
11 41 flame 1/2 inch non luminous not
pure blue but like top alcohol flame
11 45 Exit flame nonlum but not blue 1/2 inch
11 45 tube pure yellow took small
top off —

1146 flame one inch not blue—non lum
1150 1/2 inch flame not blue non luminous
1150 raised flame on retort to full — 1153
slight tip of luminosity inside flame which
is 1 1/8 long. 1155 Luminous point 1/8 inch
flame 1 1/2 long 1156 Luminous point 1/4 long
1157 flame 2 long 1 1/4 luminous
1158 turned down retort more than 1/2
say 2/3. flame nearly 3/4 luminous
with tendency to Lampblack on tip
by turning down flame shortens, 9
now raise it again but not full. at the lower
12 midnight = 12 flame about 1 1/3
long - 1/2 luminous 1/2 yellowish that being the
outside of flame 1203 - flame 2 long
little more than 1/2 Luminous with Lampblk
tip slight although it dont deposit db on
turned over it flame 2 1/2 at 1204
I turn down retort little, tube bright
yellow I turn off little air + gas
1205 flame 2 nearly 3/4 luminous
yet great deal Hydrogen has 2. Lampblack

making horns on tip flame
1208 - flame 1 3/4 3/4 Luminous very small
L black horns - tube bright yellow turned
off little air + gas - no signs yet of any
solid dust in center of flame - 1210
flam 4/5 - luminous ~~faintest~~ trace of
L blk horns - about 1/2 inch from base flame
non luminous. + only a faint yellowish outer
Edge - 1212. horns disappeared - flame
resembles ordinary gas - Tube not quite
so bright a yellow but bright. 1215 flame
same - 1216 - flame same but spurts
little, tube bright yellow 1219 [illegible] -
1221 - flame same except 3/4 long
+ spurty - 1223 raised flame on
retort, 1225 flame 1 1/2 same character
1227 flame 2" long same character
no horns of L black - 1228 turned
flame out on retort 1231 turned
off gas from furnace, flame at
exit a pin head - Fvst

Oct 12 91 (115)

Turnspit filled at bottom with Lampblack but carbons more silvery than Expmt 3 with even less hairy. The deposit about 1/2 had the fundamentals at bend but not on leg = none stuck = most of the lampblack was in bottom of semicircle - Evidently the luminous last end gave the Lampblack still It might have been due to the Extra bright yellow verging on white that I had tube at one time, this temperature may have decomposed Hydrocarbon & gave Lampblk which would not have decompd if temperature had been lower - as the bend gets most deposit we are going to use a plate to retard flow of gas just at filo



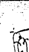
+ also to conduct heat to filo better by conduction & radiation

2 setup nome bkn 2802

Recd 129

11 minutes 1st app tiny non lum
$13\frac{1}{2}$ blue flame 1/2 inch long

Expmt 5 – Oct 7 291 (117)

 – plate turnspit –

$12\frac{1}{2}$ oz BS – Big retort

Lighted retort flame about 1/2 flame
at 304 am – notice 305 non inflamable
air coming out slightly Lighted big furnace
at 307 considerable non inflamable coming
off 309 non inflam still coming 311 ditto
312 tube red, 312 non inflam still coming
314 raised retort flame little, ~~315~~
first appearance of tiny non luminous
flame tube dull yellow at 317. pure
blue flame 1/2 inch long $317\frac{1}{2}$
319 – Tube pure yellow = I'm not going
to let tube get so hot this time
320 flame pure blue, $\frac{1}{4}$ @ 1/2 – 322. inch
long bluish not pure blue 324 – Mauve.
1/2 inch long – tube bright yellow turned
off little air & gas – Small top been off
3 or 4 minutes forgot to record time
326 – flame got small turned on more

Oct 12 79 (119)

flame on retort, 327. flame non Luminous top of alcohol Lamp Color Mauve flame 1 1/2 @ 1 1/4 long semi trans but no luminous tip in center at 328 1/2 — tube yellow. 330 semiluminous no Luminous tip - 1 1/4 long 333 - non Lum no Lum tip flame 1/2 inch 335 Knocked Lampblack off retort flame now inch non Lum (10) semi no Luminous tip no horns Luminous tip appear 1/16 long at 336. at 337. flame 1 1/2 long tip 1/4 inch turned flame on retort same some - 338 flame 1 3/4 Luminous part 3/4 340 flame 2 inches with non Lum border one inch Luminous no horns tube yellow - 341 - same exit flame - notice tap to the two flames not opurity 343 same flame - 345 same flame no horns of Lampblk - still got non Lum border of flame non Lum 1/2 inch from exit - flame 1 3/4 long 347 same flame but less luminous

(121)

349 - 1 3/4 long about 1/2 non lum Oct 12 91
350 flame 1 1/2 long more than 1/2 non Lum
tube pure yellow - 354 same flame
so far flame only spurted out once + then
not bad - . 356 - flame inch 3/5 non
Lum 4 am - flame 3/4 inch 3/5 non Lum
404 flame 3/4 - 1/2 non Lum - tube
yellow - 404 turned off retort
flame - 405 flame 1/8 inch
for fear diminished heat on tube
while something is passing from
retort may give Lampblack
I keep flame on 2 minutes after
flame disappeared - flame dropped
407 - 407 turned - fig no on
big retort, = all covered with
Lampblack - Carbons had been
deposited on but afterwards
Coated with Lamp black

Oct 12 91

the plate is a failure as it gets
covered with lamp black & pbly
dirties the carbons, however
I am going to leave the
plate and try it again stopping
as soon as luminosity shows
itself

Expmt. 6. Oct 12 91

20 oz BS big ~~retort~~ = plate turnspit — The increase from 12½ oz to 20 will give a longer non luminous flame as I propose stopping when ~~the~~ signs of luminosity occur —

5.05 Lighted retort full blast,

5.08 Started furnace

5.12 tiny non luminous blue flame appears

5.13 " " " ½ inch long

5.14 notice this blue flame is tipped with ⅛ inch luminous flame

5.15 flame ¾ long ½ of which is luminous —

5.16 tube full red verging on yellow flame ½ inch long ½ luminous

5.17 ¼ inch " ½ "

notwithstanding ~~the~~ full flame been on retort

5.18 suddenly flame 3 inches long for 10 seconds. then goes to blue with inner ⅛ inch tip of

luminous flame 1 1/2 long this is at
519 — 5 21 3/4 nearly all non luminous
except 1/16 inch inner tip — 523 tube full
yellow - took top off — 525 3/4 flame
mauve - no luminous tip ~~or~~ faint one
529 - flame 1 1/2 1/4 inner luminosity —
Shut off retort. flame 1 1/2
1/2 inch inner luminosity —
530 flame inch 1/8 inch inner luminosity
533 flame dies out, tube whitish
yellow turned off ~~some~~ gas ravine —
535 turned gas off ~~by furnace~~

scarcely any deposit —
hardly any Lampblack
though Carbons trace
Some on —
dont make Curve
no

Expmt. 6. — Oct 13 91

started flame retort full 11 58 am —

at 1202 started big. furnace —

1210 — 1½ ~~ok~~ 2 inch ½ x ½ luminous

near lum — Lamp blacky

~~blo~~ spurts smoky center to flame

white smoke — oscillatio

flame 1211 2½ @ 3 long smoky

white center — flame size gas jet

red from excess smoke. Tube

yellowish Red at 12 13. at 1214

flame bigr than gas jet awful lots

smoke from tips flame at

hole where rod comes through yellow

smoke — Tar —

tremendous 5 inch flame

clouds lamp black blows

straight out — had turned down

retort flame ½ size at 1217

Tar dropping from exit tube

blowing strong spitting 1218
tube full yellow .. flame 4 inches
long round - Redish & blk tip -
fast dying down . 1219 turned
up retort to full again - now
1221 blowing 4 inch flame -
Tar coming out tends stop hole
Swt shut off Retort 1225
flame 1½ smoky -
fils good elegant but all
lampblack pbly subsequently
deposited

133

130 Rows Exhausted by Oct 12 [illegible]

[illegible]

[illegible]

Oct 12 91

Expmt 7 — Lighted [illegible]
[illegible] 1010 — let in [illegible]
drops BS in Beyol — at 1016
begins hot [illegible] lighted at 1011
dull red — I let in up to the
[illegible] 3 [illegible]
[illegible] — shut down 1110

didnt go above dull cherry
[illegible] Red
cherry — no Lampblk showed on
turn rod when pulled way out
didnt let more than 10.0 drops
in after 1015 =

No deposit Lots Lamp black
in bottom on nickel

Experiment 8 oct 12 91

Started 1150 - run to whitish yellow full let in 3 or 4 drops 4 times - started with 6 drops in before lighting
at 1227 put in 4 drops flame tiny - but luminous except lit 10 minutes - 10 drops 12 30,

no deposit no lampblack

oct 12 91

131 Keno -

Reps depd 90 thru oz Che Sul to put Keno soaked several hours + then ran through regular Carbon Andulating + marked but very shiny + no hairs from Cloth -

Oct 12 91 (141)

Exp't 9 – small retort –
Coal Tar pitch – heated up [illegible]
1 minute before lighting furnace
started 4 15 – jerky blue
flame after 5 minutes –
no luminous flame at all
blows – jerky through whole
time stopped 4 47 — tube
always bright yellow
No perceptible deposit
on Carbon Some hairs just
shade Lampblack on nickel
bottom —

143

Expmt 10 - Oct 12 91

Anthracene 1 @ 1 1/2 oz Crude

Started 530, —

finished -

We heated retort after 10

minutes too strong when

suddenly lot went over

into hot tube + made

lots gas + deposited

Lampblack -

Expmt 12 Oct 13 91

Turpentine in Florence Flask in sand bath — passed City gas through tube by lighting — then connected to Flask ~~gas burner~~ started furnace

1134 am — city gas is burning ~~[illegible]~~ 1/2 inch flame
at 1140 at 1150 there is still gas
non lum coming but this may be the
Turpentine Vapor — 1151 — Turp slightly
boil = flame unmistakably Turp
burns Lampblk ~~luminous~~ reddish
1153 — tube reddish yellow 1210 shut off

No deposit of Lamp black — scarcely any Turp went through as it condensed before it got to tube

Expmt 11 = Oct 13 91

Lighted Retort & gas simultaneously
.852 pm - put 1/2 oz Hydro-Quinone
in small retort, run for 1/2
hour - Lampblack deposited
Carbon evidently no deposit

Wg

Expmt 13 - Oct 13 91

Metachloral in retort started
retort + furnace 10 07
stopped at 1041 -
no deposit no Lampblack -

(151)

Expmt 14 = Oct 13 91

4 oz BS big retort lighted retort at 1257. started furnace at 1,01 pm

Exit blowing non inflam - tube light Cherry red am going to keep it at this slight amount inflam

gas coming 107 pure blue flame never appeared alcoholic flame now 113 - alcoholic except tip somewhat Luminous. slight tending lampblack

114 - now 2 1/2 inch Luminous flame tube Cherry Red not light cherry slight dust in Center flame 2 1/2 a 3 long luminous & Lampblacking - tube light cherry 119 -

136 Stopped no deposit no Lampblack

Expmt 15 = Oct 13 91
4 oz BS tube to be
Kept yellow — orange started retort
236 pm = Stopd 333
found Lampblack at ingress end
on nickel and some Lampblack in
form scale 3/4 rest way but at
Exit End where scales was dense
Carbons blocked.

Lampblk in Center

no deposit —
This Lblk in Center shows LBlk
deposited low temp — the flame
was always 1½ @ 1¾ long
½ luminous ½ non lum at base
There was plenty Carbon (?) in
of flame ½ @ ¾ inch in

hours run & it deposits right for 56 minute run there will be plenty Carbon –

Expmt 16 – 4 oz BS –

going to run tube yellowish white & keep 1/2 @ 3/4 flame ~~with ...~~ 56 minutes –

Started 4 19 – passed City gas through – Lighted Retort City gas coming out 2 inches long running after lighting fireman stoped 5 10, found nickel turnings melted to iron or rather iron melted –

Expmt 17 = oct 13 91

4 oz BS big retort - new tube Carbon box filled (10 mesh) carbon file on top. inside tube has iron scale & in addition I put about 2 thimble full Ferric oxide in fine powder all over inside tube =

Started retort 1222 am -
Lighted furnace at 1225 am -
Exit tube blows considerable at $1225\frac{1}{2}$ non inflam - at 1230 still blowing & non inflam big tube very dull red at 1232 blowing & non inflam big tube yellowish red - at 1235 blowing more but not sufficiently inflam to self ignite,
$1235\frac{1}{2}$ inflam gas appears self lighting - Alcoholly - but a faint deep blue base $\frac{1}{8}$ long the Alcoholly being 5/8 long I notice $\frac{1}{32}$ inner luminous tip Big tube at 1240 ~~[illegible]~~ Light orange yellow took Crucible out.

Oct 13 91

1241 base of flam 1/8 long very blue flame inch long inner Luminous tip 1/4 inch outside yellow fringe - blue shows CO Lines in spectrum - 1248 tube whitish yellow turned gas down flam 1/2 inch yellow very little Luminous blue base still there raised heat on retort, the flame is yellow + Na Lines strong pbly be blue of Inward for Na as CO Lines show strong even where the flame is yellow with Sodium 1253 Luminous tip seems to have gone or is masked by Na - flame now 7/8 long 1/32 blue base - tube whitish yellow 1255 flame 1 1/4 long very Na yellow CO lines hazy blue base 1/16 - 1258 flame 2" (1/4 inch blue base very yellow - Luminous inside 1/16 long

1 am flame 2 1/2 long Lum tip 1/8 Blue 1/4 inch - very yellow Na - CO Lines fairly strong 104 took flame away from retort

105 Exit flam $\frac{1}{8}$ lay - ~~at~~ Oct 13 '91 at $105\frac{1}{2}$ shut (161)
gas off furnace No Lampblack
inside or on box no deposit on
Carbons Except few hairs on Carbon
nearest Exit -

Experiment 18
4 of Bs - 4 or 5 -

thimbleful of Ferric Oxide -
Lighted Retort at $134\frac{1}{2}$ Took light
away at 135 as there is good
non inflam blows. Lighted furnace
at 135 am - 141 flame not self
lighting notice somewhat inflame
I am pulling light under & away
from retort so as Not to distill
off ~~too~~ much before big tube
gets yellow

Oct 13 91 (163)

145 tube yellowish Red - inflam gas but not self sustaining at 145° — at 149 - flame pulsating so it wont remain lighted - tube yellow - flame wld be self sustaining but pulsating at 153 about $\frac{1}{4}$ inch but blows at intervals - Very strong heat on retort yet very poor flame at Exit - yellow flame Even when started dont notice blue base but flame being only $\frac{1}{4}$ inch long pbly wont show it 157 - flame steady 5/8 $\frac{1}{32}$ blue base - yellow - 2 am flame $1\frac{1}{2}$ bluebase $\frac{1}{8}$ inch luminous inside tip $\frac{1}{16}$ flame yellow fm Na CO spectrum

Oct 13 71

201 flame 2 inches long $\frac{1}{4}$ inch blue base Lum tip $\frac{1}{4}$ inch yellow Color from Na — 202 - flame $2\frac{1}{2}$ long 3/8 blue base — 5/8 Lum tip yellow. 205 flame 3" 3/8 @ $\frac{1}{2}$ blue base - inch Lum tip CO spec yellow — 207 - 3" flam 3/4 Lum tip base flame Mauve like & some bluish very strong flame on retort, increased flame on retort at 210 flame at Exit $3\frac{1}{2}$ long mauve base 5/8 - Lum tip 5/8 yellow Na outside — CO spec 212 suddenly tar came through or more pbly as drops were transparent water flame full scintilla

Oct 13 91 107

meso there is no doubt it was
water from reduction of Ferrous
Condensed in Long tube & then blown
out by gas ~~p~~ at 216 put
flame back under retort.
flame at exit 1 inch - no
luminous tip no blue base - Yellow
219 - flame $2\frac{1}{2}$ inches Narrow
base $\frac{1}{2}$ inch - lum tip 3/4
think Mauve color is pure blue
masked by the yellow -
at 224 Raised heat on retort.
3" flame 5/8 blue of Mauvish
Color on base + $1\frac{1}{4}$ Lum tip
flame yellow - Black horns appear

Oct 13 91 (169)

230 - flame little oscilating

3 @ 3½ long horns with LBlk -

inch ¼ Lamblip - 5/8 @ 7/8 blue

of mauvish tint yellow Na envelope

Shut off gas from retort

230 — tube has been whitish

yellow right along - stopped at

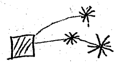
232 — Carbons stuck

together somewhat silvery

but Coated with fine hairs

with balls on Ends of hairs

of still finer hairs



+ this way all over no Lampblack

now I think this phenomenon is Oct 13 91 - (171)
due to Electrification from heat
+ decomposition I am going to
try it over again putting an
upright in lid of retort & connect
to city gas, then with Rubber
ball + while retort is going
give oscillatory waves to
stuff from retort.

Expmt 19 — Oct 14th 91 ah there forgot

Big Retort. 4 oz BS —

Still plenty Ferric or magnetic O on probably in tube — Have Cock on between big tube & retort so we can pulsate the gas —
Lighted gas on retort. 4 20 —
Cock open — Exit tube I broke off & made hole twice as large probably have ~~to~~ make it larger — started furnace —
4 24 as exit blowing = we put flame on & off Retort so as to get Big tube to yellow — Since I knocked scale off big tube I can guess temperature better 4 32 flame inflammable but dont self sustain tube yellowish Red — flame selfsustaining blue base & rim

Oct 14 91 (175)

Luminous stopped at 5 o'clock am

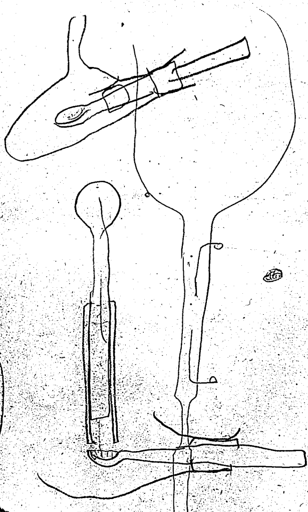
during whole time I opened & closed Cock at interval of 10 15 & 20 seconds the flame ~~out~~ when retort hot shot out 6 @ 10 inches & then suddenly died away to 2 inches then a second to inch most time was a luminous inside tip & when flame returned from shooting noticed Lampe quickly Luminous say 3 @ 4 inches - Tube was nearly all time bright yellow somewhat whitish.

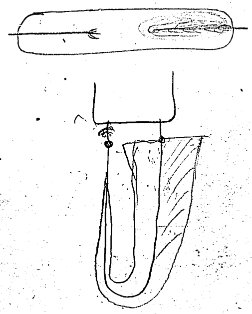
This plan I think must be OK = No deposit fine hair fluff no long fibres as before!

(177)

Started another Book Oct 14/91

TNE





Notebook, N-91-10-14

This notebook, which covers the period October 1891-October 1894, is a continuation of N-91-09-03. The book contains notes and drawings by Edison regarding filament deposit experiments, nos. 20-35. There are also notes concerning related experiments, including tests of basic pH solutions for treating filaments. At the end of the book are two loose pages of notes by an unidentified experimenter. The spine is labeled "124." The book contains 197 numbered pages. Two loose pages have been inserted into the book.

Blank pages not filmed: 30-31, 66-67, 118-193.

N-91-10-14

X-E-172

Continued

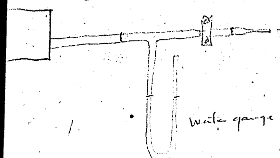
1

Oct 14 1891.

Experiments on deposited Carbon on Carbon filaments Etc in hot tubes from Carbonaceous Vapors

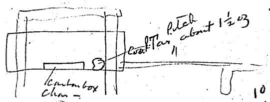
Experiment No 20

4 oz Buff S = Big retort Carbon box, char-



Lighted retort 325 - Lighted furnace
330 pm —
going to deposit under slight pressure
340 6" pressure — Shut off
retort 4 pm - Very little if any
luminosity to flame during
run fils having ng — no deposit
10 silvering

Experiment No 21   Keno 133



10 set up more 6 hr 790 hours

started furnace at 455

458 - flame blue - then blue & luminous tip yellow vapors appear in glass = fine Exit gas smoky

flame 1½ long at 5 pm

dusky center appears in flame at 5 -

flame very [illegible] -

when I have inch pressure

flame blue inch long

& keep from 5 - till 5-06   inch press

then increase to 2" pressure

flame 1¼ long ¼ blue base bal luminous no yellow

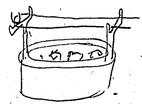
7

slight horns 510 took pressure off
flame 1 1/2 smoky horns 3/16 thick
Very luminous 1/8 @ 3/16 mantle base
Central dust stream -
tube yellow - 515 I pulsated it
10 times by holding clamp shut
until 3 inches pressure then let go
pulsated it between 515 & 520,
Shut off at 5 30 pm —
Carbons shiny no blk not heavy deposit

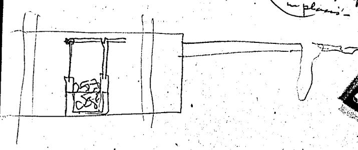
Oct 14/91

Expmt No 22

In Center of Tube round iron box with say $1\frac{1}{2}$ oz Coal tar pitch.

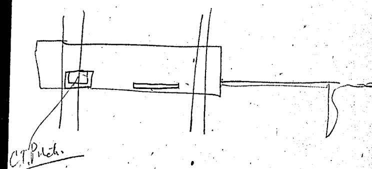


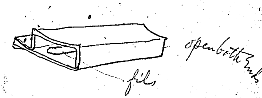
(Carbons smoked up but ~~bad~~ heavy gray deposit in places:-)



I light furnace turn to yellow fast as can keeping about 2 inch pressure + sparking it.
started furnace at 1012 pm
stopped at 1037 - Tube orange towards last
flame 5/8 - very luminous
sparked + all time -

Expmt. 23 — Oct 15 91



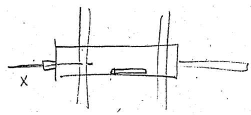


Started fire at 1.16 am Oct 15/91

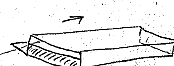
Stopped 145 ~~deposit ...~~

Too much tar

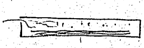
Expmt 24 - Keno 132



Put small pieces pitch in at X by rod -
Same box as Expmt 23 - Carbons good
shiny but thin = while I only put
in altogether say equal to hickory nut
pieces pbly too big - to prevent sudden
rush & Extra deposit - I use ~~same~~
pitch at same rate as before but fix
by thus



only place gas get in -



Started 6.05 am 15/91
Stopped 7.05

(15)

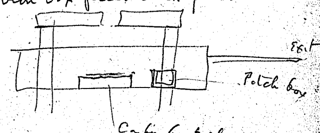
9 Kept Continuously pulling
in small pieces leisurely –
withdrew rod slowly so as
not to puff flame at Exit
or disturb inside gas by sudden
movements = at one time for 5 –
minutes we had almost white
heat it was about 658 to 702
only 2 top burners why then –
at no time was the Exit
flame more than 1/4 inch
& generally none –

Carbon not noticeably
Ofound no hairs guess
no deposit. –

Expmt 25 = 15 Oct 91 (17)

Started 4.9 pm

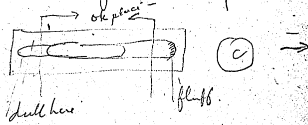
By passing products decomp Pitch over carbon large amt lampblack etc passes over whole of you put Tar towards Exit & Carbon back beyond tar no lampblack goes back only compounds hence I think Gotten results as in Expmt 21 = I now use the round iron box filled with pitch



Now in flame smoke comes off
first if held right in flame it
burns rapidly shows no gas only
solid particles heat of big tube
not being sufficient to ultimate
decomposition smoke is mixture of
white + yellow - 415 self sustaining
flame - 2 1/2 long very smoky
Central dust all yellow
flames 3 @ 6 inches very irregular
pinched it twice shows considerable
pressure - 418 Tar comes -
4 inch flame very smoky 419
rather steady now primarily
pulsating tube dull yellow -
422 flame 3 1/2 very smoky -
no tar - dusty Central 90 pct yellow
10 pct white dust, 425 flame 2" long
very smoky 60 pct white 40 pct yellow

tube dull yellow - 428 flame $1\frac{1}{4}$.
very smoky 431 flame inch long
scarcely any smoke but Luminous
90 pct white. I find though
the flame don't show much more
or smoke by holding tip in al
flame there plenty smoke -
~~Th~~ flame $\frac{1}{4}$ inch stopped 4 39.
a Run of 30 minutes -

Carbons good shiny



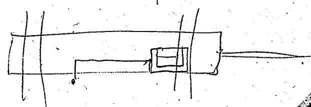
We now rearrange them + put them back in Carbon box
reload pitch cup —

Expmt 26 — Oct 15/91 (23)

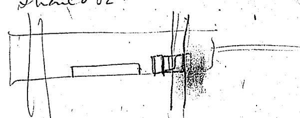
Experiment 25 duplicated same Carbons put back & plate Cup reloaded —

Started 503 pm — 509 — 4 inch flame very smoky. central dust, 95 pct yellow dust, This went little quicker on account furnace being hot, 511 5 inch large very smoky flame Lampblk flying all over me — 516 flame 2 1/4 very smoky 50 pct white smoke — 520 2" flame smoky

I find that owing to fact I forgot about thickness of tar box the mounds have following position in tube



should be:



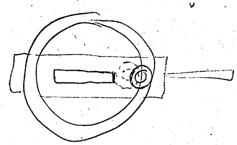
525 - $1\frac{3}{4}$ long flame very smoky 530 flame $\frac{1}{4}$ inch little smoky when tip held in Alcohol flame —

Shut off 533

owing to too rapid working of pitch back draught too strong smoked Carbons

Expmt 27 - Oct 15/91 (27)

I again duplicate 25 but start furnace only about 100 fahr. and this instead of as before as shew by dotted lines with hot furnace



Started 7.40 pm at 7.45 smoke coming not self lighting but ignites in flame - flam 5 @ 6 long & self igniting blows bad 7 inches long great Lampblack at 748 = 749 Tar -

Tube light yellow - Top off -
750 - Tar - flame 3 @ 4 long very smoky 753 still Tarry - flame 3 @ $3\frac{1}{2}$ long smoky
Tar bothered hole had knock piece off - hole larger flame sluggish not now the back pressure as before flame goes up $1\frac{3}{4}$ long smoky -

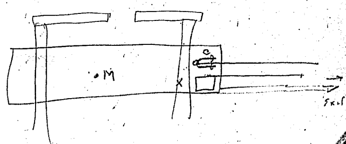
802 - flame $1\frac{1}{2}$ smoky tip

805 same " "

809 - about $1\frac{1}{4}$ flame smoky
Shut off ——

Expmt 28

Started 1013' –



Idea is to make Chrysogen by moving tar box towards X then twirl fils at C to Coat, then withdraw tar box & thrust fils ~~[illegible]~~ to M which is to be full yellow heat in tube – then go back & do same thing over again –

Stopped 1045 Carbon fil rod got sticking Shut off – $\frac{1}{4}$ inch flame Composed of smoke Came out continuously after

The first 6 minutes or so
Tube full yellow -
not shiny but Even heavy
deposit all over not slick
∴ deposit too rapid

134 Keno

30 hours
all busted

Expmt 29 — duplicate of 28
but with better waking
rods

Standard 1250

good

Keno 135 =

grey - but showing under Micro on
black background —

16 oct/91

Expmt 30

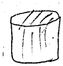
started 941

Stopped 1016 –

Carbons on dark background shiny

Even – Keno 136

Expmt 31 -

Napthaline =  one cube

started at 1128. —

Stop 11.55 — good - better than Expmt 30 more even & more shiny

Napthaline too sensitive but with longer tube so it could be kept to give non lum flame think it would be good its better than pitch,

Keno 137 —

Expmt 32

~~Started~~ 12 55 —

Hardest paraffine —

Carbon not much deposit of any

Lampblack — 138 Kand

Expmt 33 —

'Tetrachloronapthalene'

Started 233 am ——

Stopped 257 —

Carbons I think shiny showed ~~that~~ way on air background & are pbly nice didnt notice the frosted silver color as in other = There was a pile of smoke Came out Everytime pulled out Carbon rod out. The whole inside tube Covered with ~~yel~~ whitish deposit yet Carbons OK showed no frosted

139 Reno —

Expmt 34

started 329 am —

Beta-Napthol =

stopped 4 am = nothing

when held up look dark

Lampblacky but both by

side + End lights ~~brighter~~

silvery = heavy frosted

appearance B Naphthol too

sensitive or didn't too

quick — Keno 140

Expmt 35

~~Meta~~-Chloral —

Started 4.52 am —

Stopped 5.16 —

No 1 dipd sevl times in
CT Pitch. matter Sol Bayol

No 2 Residue (black) from
BS disolvd Bayol dipd
sevl times.

No 3 Dipd sevl times Bayol
CTP without heating to
~~prevent oxdation~~.

No 4 dipped Chloro)
CTP sevl times dried
each time.

Nickel Maned' 20 mesh Char
pm
235 - till 1230 pm -

No 9 - Large bunch of previously
prelim Bamboo from Man[illegible]
Force in charcoal

No 10 not prelim Raw bamboo
about 100 in bunch - charcoal
tied with Thread. -

No. 11 005 - 2 cbt 1 Cam -
dipi [illegible] chloro worked spatula
glass plate = Stuck together
but got a few - Was in Small
box no charcoal

No 12 Same in Charcoal
Stuck but got 2 or 3 -
were longer showing very light

weights prevents drawing up - showed be no weight

No 13 Large size .008 I think worked little dif with spalite & oft... plugged, makes which I believe 11 + 12 were not =

Browns Solution No 1 - Coal tar pitch dissolved in Chloroform + Lampblk taken out by filtering Brown 1 & 2 are from this No 2 Reg length showed rise to 128% cp & only fell to 93 at 320 hours

(57)

Brown Palm No 2
part of Coal Tar pitch
Sol in Benzol —

Brown Pal No 3
old Cont. Little Cam
+ plenty chloro

NO 1 — 2000 hours broke
1800 " "
2 2300 "
3 2100 "
4 1700 burning gang 5-1k
7 1700 " "
8 5 out 9 bkn 360 hours.
9 7 out 9 bkn 360 "
~~9~~ 8 setup 360 c php
NO 11 — 003 —
No 1 Lamp 223 1/2 volts,
of 2nd Lot No 1 lamp 228 volts
2 " 228
3 " 228
4 " 229
5 " 228 —
6 " 246 —

Set up Tuesday pm 10.50
gang 4th =

New numbering system

No 300 is Reg bamboo run to yellow in Ni moved Lab - & gave 124 volts & about 300 hours. those taken to Marian & dipped twice in old Reg 17 1st with Camphor only & full yellow 2nd Coal Tar P & same Camphor & redipped & run to full yellow — now gives 108 volts 262 hp - they are flashed somewhat by Coal tar or Cain

No ~~302~~ 301 bunched fibres 100 12 hours run to yellow (low) 1st attempt in big furnace Oxidized to blue & yellow -

No 302 = same in another bunch (same run) but not apparantly Oxidized

(63)

303 No 19 aylsworth - undip
Cbns 15 hours subinelled 2 hours
fused altogether 1 hour of
which white heat. heat was
dazzling feeble vitrified.
none heated, previous life
before this 235 hours at test.

304 2 dips cooled in
iron Box gaso - fused 3 hours
white hot in old furnace
aylsworth 21 (a) -

~~305 aylsworth N020~~
~~2 dips without fused~~
tried this before.

305 is Brown 21 gasoline

306 is Brown No 22 Coal T

307 is Brown 23 Camphine

Stuff in test tubes

No 1 1 grm Bicarbt. 1 small bottle Dipi thin chloro

No 2 2 grms others same as No 1.

No 3 3 " " "

No 4 4 " " "

No 5 Syrup in chloro with little Dipi

No 6 – 8 grm Bi Cbnt small bot dipi chloro

308. 4 times dipped & pumped
in Dupi Conbat in Chloro No 4
4 gram

---

309 - 4 times in 8 gram sol
as above -

---

310 - dipped thick sol
Syrian in Chloro with little
dippi - [illegible]
Reno containing little ChlSol
remained in about hour then
out & in Benzene all night -

311 - Same as 310 but allowed to dry
for 1/2 hour & then soaked in
Reno with ChlSol all night
out then in Benzene's for ___

Bases May 5/93

Carbolic C pin NH_3 Electrolyzed then pp by acid very black stuff Considerable quantity - fairly sol in Iso b and Picalin - infusible Ismell aniline on Carb[illegible] [illegible] from the Impurity in Water NH_3 etc

good

Another probable Case

Oil Sassafras in strong H_2SO_4
little at time until no bubbles -
then pour in large quantity
water big pp - then filter &
wash with water, then when
water filtered off add mal
dissolves most of it remove
the mal sol in strong HCl
with little H_2O pp it then
filter & dry - test of water
Cant be got out by a volatile
solvent without dissolving
it = Dont melt

above without getting oil.
Water can pl. be ignited
& probly work ok =

(73)

Dinitrobenzene is reduced by Electrolysis + black is ok I think if all un decomposed Dinitro is dissolved out.

Nordhausen on absol al- black stuff ~~tho~~ always thought to be Carbon but found that it is Thiomelanic acid - quite large product, partially sol in ~~Heat~~ aq NH_3 not very much - If cared get solvent turned be good base

gallic acid with NH_3 + Electrolysis
no pp but solution dries to
glistening black sub - puffs
very little - large product; but
there is an enormous ash
was this in gallic or NH_3
pbly good base if ash out

Oil Thyme - Thio 3d -
part sol that is pp by
acid - Black oily
swells little, good -
get stuff out that swells
it then its Elegant
very black - dense - shiny
large quantity obtain

Good base - no trouble

Act on Sugar with strong H_2SO_4 - by adding just little water to make the Carbonaceous residue - Wash it well by grinding fine while wet in Mortar, then filter washing with water, be sure & get it fine - then oxidize to yellowish red by strong HCl & $KClO_3$ - if not red enough wash with water thoroughly & then alcohal & dry repowder & treat with fuming nitric, throw in water - wash & then Mal

Sol in Dips after heated Iso Ba
not perfectly sol -

Dont think this loses much weight & is cheap & good - if NH_3ClO could be used be better -

or if fuming alone would then be no cost

(79)

Purified Gum —

Carb gum from H_2SO_4 Bal
Copabia — added in 6g HCl +
KClO — very light greenish
stuff Carbon with no signs
[illegible] — turns
reddish yellow like Ray
in — Depi — Too & even that
seems just as good — its super
& Cheap! — Make a lot.
Leaves no [illegible] ash!
Carbonaceous residue when dry same
does ditto fairly well

Good

Gum arabic SO_4 Carbon Oxidized
by fuming 24 hours acts same
as above with Solvents +
has absolutely no puff — its not
so sol in Depi but [illegible] Mal good

glycerin Carbon
with HCl + $KClO_3$ –
best solvent + one that scarcely
Cracks Esobit,
Mat – Chetty + mal [illegible] Ethyl
Chemlin pyridin all shrink
+ crack greatly –
glyc Carbon best so far
dont puff much or any
more than Reg with Es + but
+ dried —

Tried this again but
not 4 sol probably not
acid on nuff. Nitric
Carbon [illegible] + other oxidyzes
Sol in NH_3 water N.G.

but think glyc — Carbo
properly oxid by HCl + KClO₃
might be worked OK —
I'm trying it again —
do it double (IC) first
in strong sol then dilute
& filter & then in a new
sol —

The following is good
base & mono[illegible]
[illegible] in acetic
acid & common nitric
poured in, turns brownish
Its sol, but pp by pouring
in large quantity water

over

filter this off - what runs
through is red & of pp. by
NH_3 Stuff is ng that is
pp. as it has Nitro Compounds
& melts also but stuff
pp by [illegible] first
[illegible] & washed well
with HCl [illegible]
got about 1/2 of original
Sol Product - Semi Sol
Chlo - Sol Iso but but
dont dry shiny
pbly Sol in lots
things -

Camphor Carbon SO_4
Hot - good work this up -

Camphor Carbon
Is at least OK -
part oxidized by $HCl + KClO_3$
yellow dark puff in slightest
+ sol in Iso + others good
Shiny red in butter dish
Work it up.
product rather small

Balsam Copaiba Carbon
oppears Sol by itself
in Iso & Picolin —
Have some on hand
dont know of 8 used
Hot SO X

Balsam Cop Carbon
Oxd by Nitric
dont puff slightly Sol
Picoline strongly
OK

There is gone [illegible]

Napthalamine in Hot SO_4
then pieces $KClO_3$ Thrown in
& pp by water dried
[illegible] — [illegible]
Carbon (and) dense & high
[illegible] — Sal Phospho
& [illegible]
Very of them —

Base fine must work up

H_2SO_4 + Camphor - hot
but dont Carbonize it (i.e.) go
so long as it becomes
suddenly solid. it may
froth up a great deal
gas come off but stop
at right point - filter
danger part left Extraordinary
black + if you keep on
adding water it goes
through filter its so
finely div - can wash it
moderately as H_2SO_4 in
minute quant wont hurt
product sal [illegible] too fine strong dry
dust proof dense -

Glycerine Carbon very
finely precipitated or dissolved
& filtered. probably sticky
stuff to squirt if so
dries to Extraordinary hard
don't puff a very [illegible] to
Oxides but perhaps
may crack --

Cam full Carbon
acted in funny also
HCl KClO for long time
became blood red &
perf sol - good —
Good base
~~bad [illegible]~~

following are good Bases -

Bottle marked No 1 BX

is Con H_2SO_4 in Evap dish & Camphor got it hot lots gas come off & I smelt SO_2 but I carried it only so far as liquid got black but not to point to make Carbon where it suddenly solidifies - then put in Water & filtered a its extraordinarily finely Divided & must have liquid that comes through put back several times, then its filter paper put out Dry, when rather dry (i.e) Edges Dry & center still moist when washed pour ~~at~~ Mat on & get it into a

beaker. then pour into a flat
Enamelled dish & Evaporate,
it Dries to extraordinary shiny
glistening black & cracks &
contracts to pieces — not the
slightest puff on Carbzg
Even the Edges are razor like
on Carbzn & gives off no smoke
it shines Even when red hot
but it cracks tremendously
a filament 1000 dia would
crack bad hence it probably
wants something with it
or a viscous Solvent that
will partially remain at high temp
to prevent cracking
The product I (illegible)

say is half the Camphor

Try Solvents

2nd Base - Bottle CX

Same as above but heat carried so far as to suddenly solidify making Carbon - this is very strongly worked with 3 doses ~~[illegible]~~ of HCl + $KClO_3$ until it very red - then air dried for 3 days on paper it dont stick to

paper. afterwards it's taken
from paper & ground in
mortar then put on agate
flat dish & ~~sun~~ dried all
day - not the slightest
puff & apparently no
gas or smoke comes off
It is very hard to wash
it as its somewhat ~~sticky~~
in filter & works slow -
perhaps best before filling
to boil -
Try Solvents
Yield very large -
1/2 of Carb at least

2 Bx - 600 cc cp. Kalbflash H_2SO_4 - 120 grms Cane - brought up slowly. got black added little water but found very little sediment so put it on again & ran it till there was not very much froth but didn't let it get solid. then turned off light & added considerable water slowly then it stood all night & filtered it with only about 3 times its bulk of water - it didnt eat paper - quite large

residue - after 1st filter
added but little water to
wash out acid - then
put the thick black stuff
in dishes in drying
oven dried several
hours stirred it
finally powdered it
then dried it nearly dry
cooled just till it was
damp - got back
about 70 grams
of the 120 - if dis in
ab ethyl ~~ppt~~ in
Benzol ok or in Reg
Mal ppt by Chloro
- ok

also in [illegible] & pp in strong
HCl - ~~[illegible]~~ it pp; but
haven't tested resultant
stuff =

The H_2SO_4 cam hot that
gatsalved. then very
little washed & in
lump just as it pp'd
put in KClO & HCl -
24 hours - then filtered
& not washed well ~~[illegible]~~
then Dried in Drying oven
212 seems to be just as
good as BX 1 BX. 2
but more yellow - same solutions
& Carbys same Will Call

it. BX-3-

BX 4 is the big Lot

600cc SO4 - 150 Cam - Solid

then washed 24 hours

then in KClO + HCl -

dilute - then strong

then filtered took

5 days + part is still

unwashed on

Egg Albm H_2SO_4 –
afterwards $KClO_3$ HCl –
dis NH_4 + Evap —

following have action as
solvents alone & in
Cannadian Bals-

Methyl Jodat
Foramid
Aseptol
Methyl formic
pyridin Hydrochlorat
phenylhydrazin
Tetramethylammoniumhydrat
a Liquid Resorcin cont
See first part Label

117

Isopropylalcohol

Valeraldehyde

Riga Balsam in Carnation Iso

Formic Ether

No 12

263

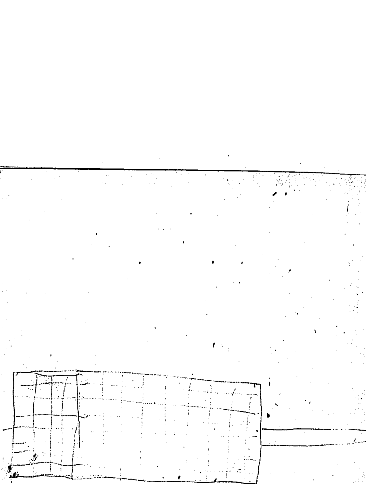
Monochlorhydrin —

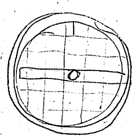
glycerin with Iso —

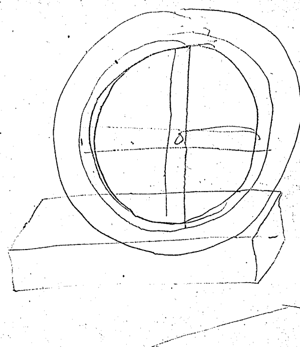
H_2O —

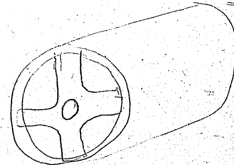
NH_4

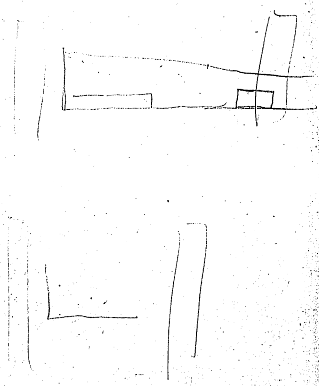
+ Iso

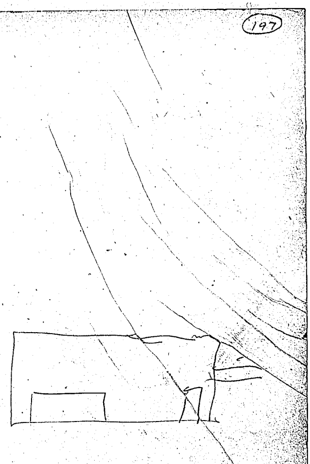












[ITEM FOUND IN BOOK]

October 13th /94
No. 28. 7.00, 12, 12.30, 6.00,
7.00. 10.00

~~31~~ Schaak 7.00 12.00, 12.30. - 9.30
~~41~~ - 8.00. 7.00. 12.00, 12.30. 9.30
43. 7.00, 12.00 12.30. 8.15

Sunday, October 14th/94
28. 7.45. 12.00. 1.00, 6.00
43. 8.00, 12.00, 1.00. 6.00

Duncan, 8.00. 12.20. 1.20,
McNitty, 8.00. 12.20. 1.20

Monday October 15/94
28. 7.00
43. 7.00
41. 7.00
31. 7.00

Notebook, N-92-02-22

This notebook was begun during February 1892. All entries are by Edison. The book contains notes and drawings relating to various electrical experiments. Included are entries regarding the conductivity of iron, magnetism, Foucault currents, telephone transmission, and the optical behavior of iron subjected to alternating current. There are also theoretical notes about the properties of aluminum, along with drawings, notes, and calculations pertaining to ore milling. Among the latter are several pages of cost analyses, probably based upon operations at the New Jersey and Pennsylvania Concentrating Works plant at Edison, N. J. in September 1892. The pages are unnumbered, and the book has been used in both directions. Several pages have been removed from the book. Approximately 110 pages have been used.

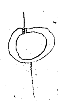
Experiments

~~Feby~~ Feby 22 1892

Make a cylinder 1 inch dia of 75% Iron reduced by Hydrogen + melted shellac - it is to be 6 inches long -

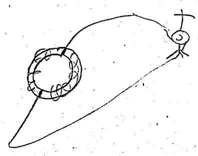
Also one with 100% iron wetted with minimum shellac in alcohol stirred + air dried - then put into cylinder, heated + pressed slightly to obtain Coherence -

Above to ~~test~~ if continuous Electrification takes place under high frequency Currents. if continuous flow can be had -

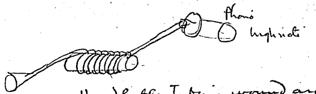


Curve of hysteresis to be run on
Red hot iron - Kept hot by Current
whole iron wire in Vacuo -

also iron bar surrounded by coils
of iron wire - whole immersed in
blacksmith fire -

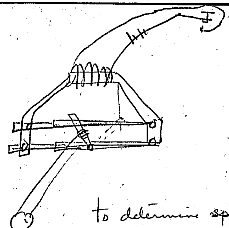


Ring split + 2 dif metals like
gold + aluminum foil inserted
differential Effect of heat of hysteresis
give current - Run Curve



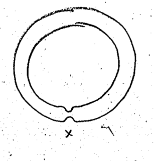
Hard Rubber Tubing wound around shell - High note - see if amplification in Rubber tube of note = wave length must be less than ~~a~~ single turn. or say the same -

Isnt it the Ultra Light that determines the flow of Electrification Current into the flow of Electrification Current into Carbon wire in glow Lamp - to prove it shield it with a metal not connected - ~~or~~ shield with glass - & then with quartz -

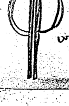


to determine speed of Magnetism in different magnetic bars like Despretz Expmt with f. Cond heat along a bar

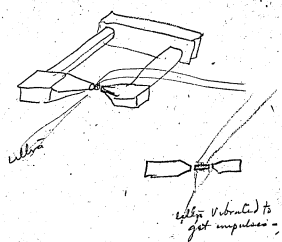
---

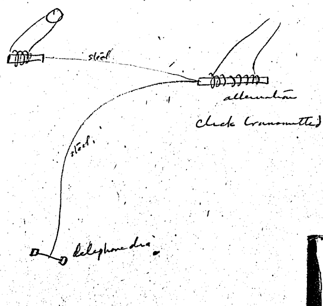


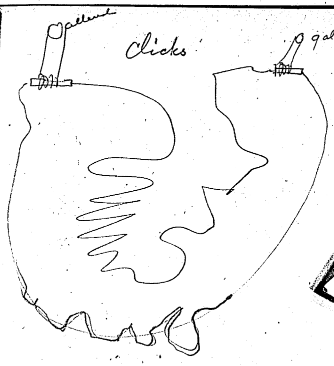
iron ring Saturated – How would be strength of lines at X & would they be permanent.

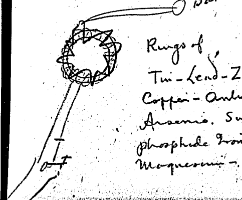


would this stay permanent on Saturation.


ultra
ultra vibrated to
get impulses -

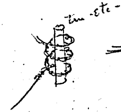

steel
alternation
Click transmitted
steel
telephone dia



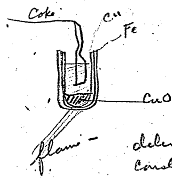


Rings of,

Tin - Lead - Zinc - Brass -
Copper - Antimony Bismuth.
Arsenic. Sulphide Iron
phosphide Iron - Aluminum
Magnesium -, Sodium in tube.



iron stranded wire -
wound with Copper wire -



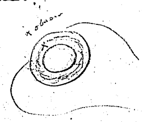
Try phos acid.
& fusible salts
which only let go
their H_2O at red
heat or above &
which dont combine
with CuO, [illegible]
free H_2O -

determine R - Volts &
Constancy + Efficiency

Try thin films of metal on glass see if they reverse lines in spectrum in same manner as Vapor of a metal reverses its own lines

---

Make film iron in closed ring & study its optical behavior under alternation of Current.



Will there be free lines of very thin - will it stay permanently changed. will stress polarize light or alter amount of color reflected or transmitted -

deposit Carbon & Iron simultaneously see if permanent magnetic result follows from mere mechanical mixture -

with a cylinder of finely divided iron mixed with conducting Lampblack act any different but reason of presence of Carbon -

---

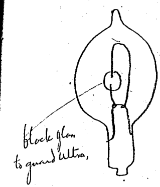
Will a cylinder of iron particles compressed together, each iron particle which was previously deposited with Copper in Vacuo act peculiar as to retention of magnetism by low resistance cloth of Copper -

---

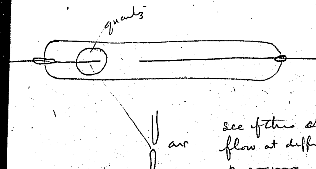
Is there such a thing as molecular Faculty in contradistinction of Mass faculty,

---

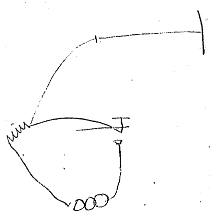
Is there an analogous Extension in Copper wire to that of iron in magnetizing by passage of Current, say Leyden -

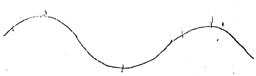


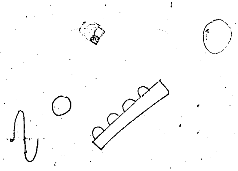
Will there be a Continuous
flow -

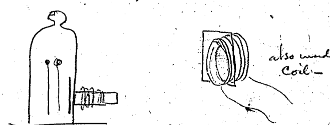


see if this changes
flow at different
pressures



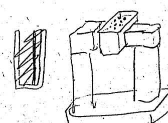


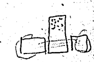




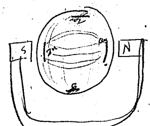
deposit the film of Iron Ni & Co in magnetic field.

Is Carbon (red or white hot) Magnetic





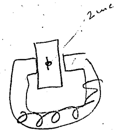
pieces of zinc coated nearly all over with shellac & stuck to Cork & floated in 20% SO_4H_2 sol then magnet if local action circuits formed ought to be attracted by magnet.



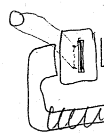
Will the magnet Cause the Current to be distorted

If so perhaps a current can be got from local action on Zinc in HCl.

Why is it that aluminum unlike all other metals does not deposit metal on the sides of a spark tube yet all the phenomenon takes place as with other metals — Can it be possible ~~that~~ pure aluminum is transparent when deposited on the sides & could be flaked off or is aluminum decomposed into a gas or what?



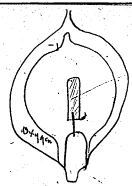
Zinc in cork in HCl —
Local action circuits
ought to cause
motion in Zinc
in the field —



ought get Current from
Local action in HCl
with the 2 plat wire
by magnet paralleling
the circuits.

See Knot Phil Mag 1890 246 -

~~Hysteresis~~ Cyclic curves profoundly
modified by passage Current,
may not this acc'ts in transformer
Effect some result.

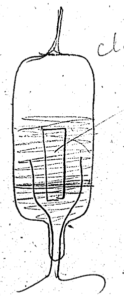


phosphorus

~~V~~accuum - Crack between
Ox. globe + Vac

glow worm light

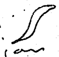
Closed glass chamber



phos -
free O + H
given off Combine
with phos give
phos acid which
dissolves + thus
glow continue
until all H_2O
decomp -

would an intermittent or oscilatory spark be recorded by. Luminous paint-

---

Dont this  in glass in Leyden jars the stream certainly cant work at 3 millionth of a sec

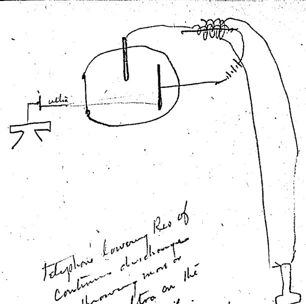
---

What relations are the Curves of loss of Energy (watts) in a glow lamp to the Curve of Magnetic Saturation,

at high Cp. every Energy added causes very little rise lamp owing to increased rapidity radiation

---

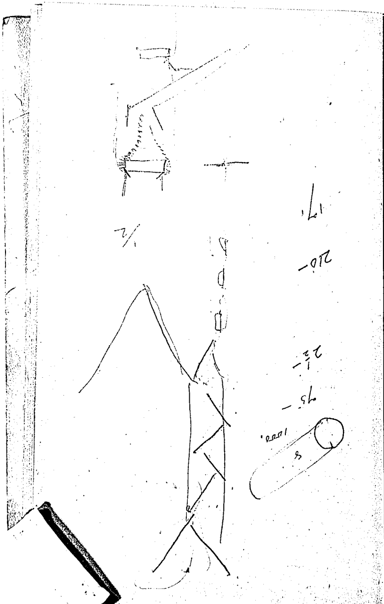
Would there be any glow in a giessler tube made of Quartz or Rocksalt

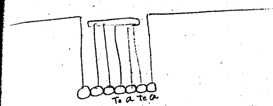


Telephone lowering Res of
Continuous discharges
by throwing more or
less Ultra on the
Right Electrode.
use 1200 Volt Current.

Expansion of Carbon Curve with Watts + Res Curve

How does the Curve of fall
of Resistance in glow lamp fil
with Rise temperature
" agree with Saturation Curve
of magnet.
is the go up + come down the
same — Carbon is plastic like
Iron at High temp



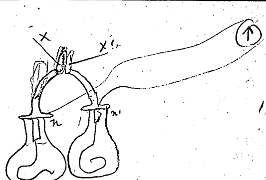


mean Emf for Etheric.

Would glass (or other things) stressed by Electrification or Magnetism permit Ultra to pass like Rock Salt,

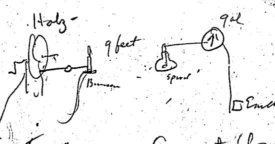
Will it pass a film of gold on Rock salt.

Why is it that Aluminum when used as a filament melt 75% stays solid as a crust. it looks like 75% XYZ + 25% aluminum

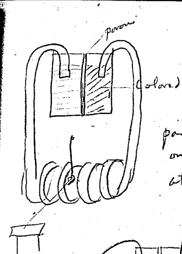


By burning different fluid
in the two spirit Lamps
currents should be established ::
between n & n' or wires in
the flame at different points
x, x' -

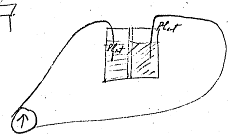
in phil mag 1887 I think is note

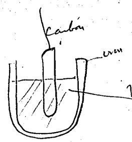


Earth Continuous Current flows.



pass light through
one liquid is transparent
other colored —





or any other metal which will give a liquid Sulphide at red heat - Reaction, CS - + Fe deposited - or the Cell of a metal + lined with a Conducting Sulphide which don't melt at Red - then use KS or NaS.

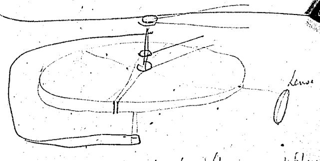
Reaction CS - K reduces S of sulphide lining to regenerate KS, Will a thermo element act different in capacity or efficiency when heated in dif positions in a magnetic field —

In Expmt C + CuO Red heat, use KO as it dissolves CO —

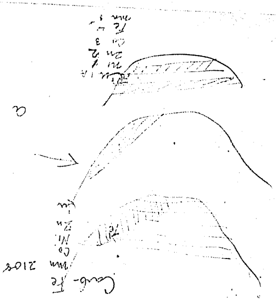
Reaction is C . . KO . CuO .

CO — KO — Cu Could use NaO,

desired



Whirling the thin band (transparent film) around rapidly with Sun focussed on it will give a Current in same direction & by turning this device alternating = Condensation will precede at Edge of heat.



Ca So4 — 3184 1<
~~Magnesium So4~~ 3023
Mang So4 2499 5th
Ferrous So4 — 2356 4th
Cobalt So4 — 2305 3rd
Ni So4 — 2294 1st
2300 2nd
Zn So4 1826 — 4 1st
Cu So4

Cu Ni Zn Co Fe Mn
1 2 3 4 5 6

Carb-Fe Mn 2108

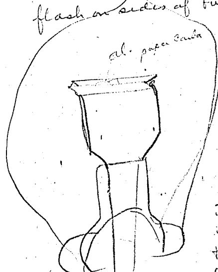
---

must be transparent yet conducting
otherwise would all be shattered
between surface & opaque interior by
~~bothalummum~~ not heated same time.

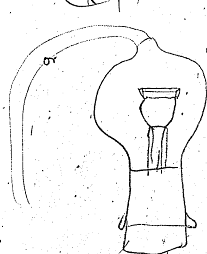
I notice atomic W Al is double + 2 or 3 greater less

Spectrum anal - Watt. p 386 -
Remark made - of all the metals
Aluminum is found to be the
richest in Ultra Violet invisible
rays - of extra extreme refrangibility
now take in the fact that Ultra
Violet waves reduce the Resistance
at spark points, & again that
in geissler Tubes nothing is
apparently torn off & deposited
on the walls it would look as
if atoms of Al periodic with Ultra
-waves & hence no rise of temperature
take place to melt the surface
Again When Al Melts as a lump
in Vac 75% dont melt & 25% runs
out - in Carbon furnace at white h
in perfectly non oxdz furnace if brought
up slowly in Cattle preserves its form
& only little melts runs out
investigate

Melt some aluminum in vacuo & let it flash on sides of bulb.



This will give sheet CP aluminum & permit determination of its R & 'R for Heat & other properties - Might allow Ultra pass through even in thick sheets -



Mang Sul 2499 Cu Sul 1826
Carbonate. 2108

Ferric Sulphate 6184 Gold aucl 228
aurous Cl. 58

Ferrous — 2356.
Cobalt Sulp 2305
Ni SO4- 2294
ZnSO4- 2300

H + Cl- Hcl- 220 K

Sulphurous a SO2 710 K

NaCl - 97?

CaCl- 1698
CaSO4- 3184
Carbonate - 2704
Chl Magnesia 1510 K
3023
Sulphide -
Alumina Sulphide 1237

The specific heat of Carbon increases as the temperature rises so Silicon - Boron - + Beryllium up to 500 - ~~now the~~ and the increase of SH diminishes as the temp rises between any two intervals of rise - Now the Electrical Res diminishes in same way, there lies a close connection between Res + Spec H ~~of~~ the two are proportional the Spec Heats of all metals could be determined by the Curve of increase of Res by rise of temperature -

We mightso ~~that any Extra Graph~~ ~~of heat~~ metals having greatest specific heat ought to be best conductors by Equal weights -
See if this is so -

In very high Vac in glow
Lamp Sulphur + other Vapor
also
say Iodine - could be driven in
by heating globe & then the filament
heated high would give a
true & pure Spectrum at *Known*
temperature -

21 ft 3

84 ---- 3" 45360
78 ---- 3 42120
72 ---- 3 38880
66 ---- 3 35640
60 ---- 3 32400
54 ---- 3 29160
48 ---- 3 25920
42 ---- 3 22680
27216

4 4^3

54
3
162
3
486
60
29160

18
3
540
60
32400

42
3
126
3
378
60
22680 —

48
3
144
3
432
60
25920

66
3
198
3
594
60
35640

8 ton

72
3
216
3
648
60
38880

24
8
192 —

16
8
128 —

10 ; 10

1/5

50 — 5.5
100 2.5
200 1.25
400 .62
800 .31

5

100 000 — 10 — 10

78
3
234
3
702
60
42120

60)1000(16
60
400
360

10 —

18,000 ft lb

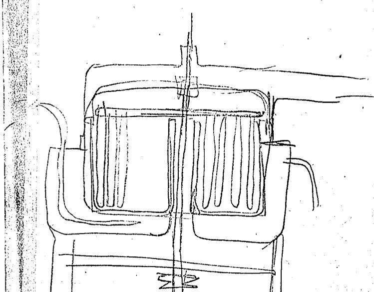
84
3
252
3
756
60
45360

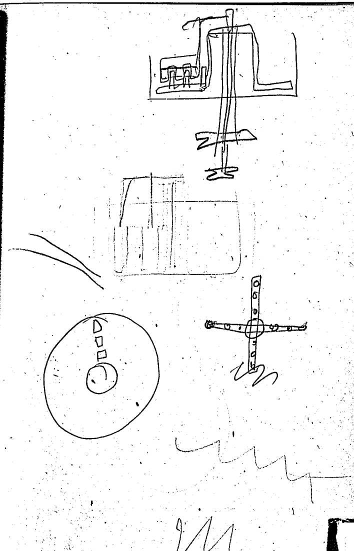
16 ft sec.

1/5 sec —

1728)272000(157
1728
9920
8640
12800
12096

157
480
12560
628
75360





7' dia 2 [illegible] 75000 lbs [illegible]

100 000 —

480
48
384
192
2304

1396
60 (48
8376
6912
14644
13824
81

175

3000 —
50 ton per hour —

150
2880

18
40
72
288

800

800

40 men

200 —

175

100 ton 1 foot in $\frac{1}{5}$ of sec

25
32
800

222400 lbs 1 ft in $\frac{1}{5}$
5
1,112,000 — in 1 sec
60
33000) 66720000 (2022
66000
72000
66000
6000

1616

20 deep -

15

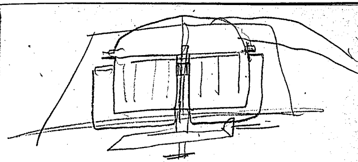
18 dia -
18
144
18
324
15
1620
324
4860
135
1728 | 4725 | (2.7
3456
12690
12096

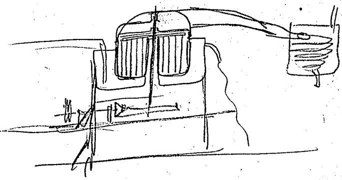
16
8000
120 | 28000
40
160
16
160
960

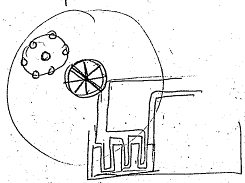
9
15
9
135

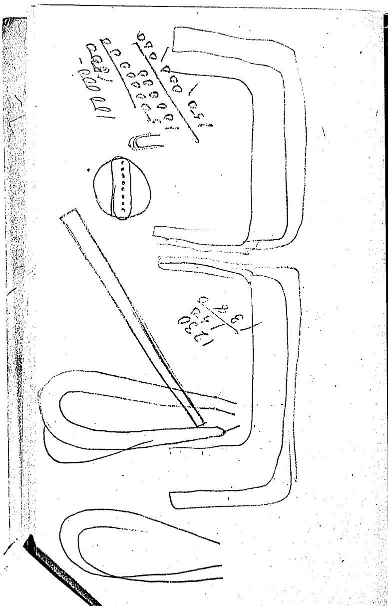
500 gms
144
4
576
600
800

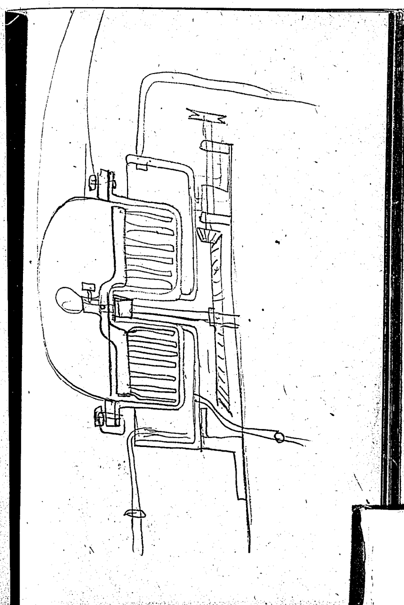
2











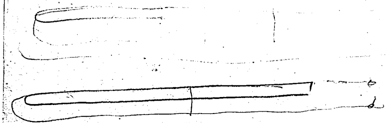
300 | 30.000

3

1200 —

100

1200 | 30.000 | 25
24.000
6000



150 m.

150 m | 35

1200. lbs

10.000 // 30.000 4 days.

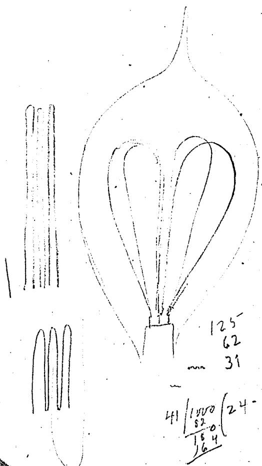
3600 · 3000 —

40 grams

580 —
800
464,000

150.000 0.00 (344
139 200 0
20 800 00
18 560 00
2 240 000

344
60
20.640 —



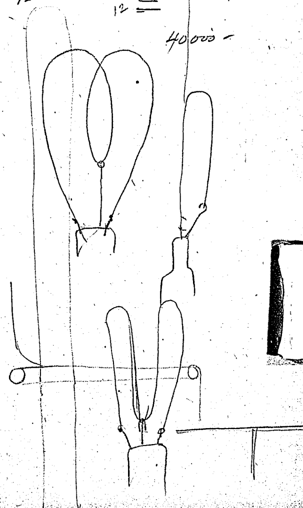
125
62
31

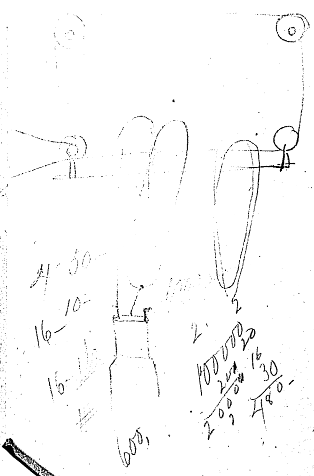
41 | 1000 (24
82
180
164

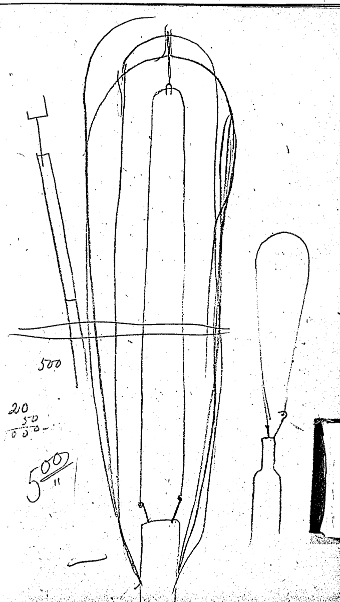
24
5
120

1 500
8
4000
12

40000




4 - 50
16 - 10
600
2
1000000
480


500
20
500

E & Freddy & John Crude —
[illegible]

E — at House, Ingots.

~~[illegible]~~

Freddy & [illegible] squint, —
[illegible] House.

Browne[illegible] Freddy Candy —
way up Country.

Store Crude in Tin Cases
House —

Store ingots — House —

~~Store squint, Safe at [illegible]~~
~~fits~~ store fils packed Cozu Moulds
Lab — Lamp fire + safe
deposit vaults

$$\begin{array}{r} 128 \\ \times\ 20 \\ \hline \end{array}$$

$480 \,)\, 2560 \,(\, 5.3$
2400
1600

$$\begin{array}{r} 16 \\ \times\ 30 \\ \hline 480 \end{array}$$

.500 lbs

64 —

480 ~~60~~

$$\begin{array}{r} 480 \\ \times\ 60 \\ \hline 28800 \end{array}$$

5 lb

200 — grms [illegible] water —

$$\begin{array}{r} 2500 \\ \times\ 3 \\ \hline 7500 \\ 5000 \\ 2500 \end{array}$$

~~24 grms~~ 20 grms

$225 \,)\, 28800 \,(\, 128.$
225
630
450
1800
1800

1728) 20736 (12
1728
3456
3456

21
12
42
21
252

465
12
930
465
5580
84
3
252

.82

144
144
576
576
144
20736

84
83
82
81
80
79
78
77
76
75
74
73
72

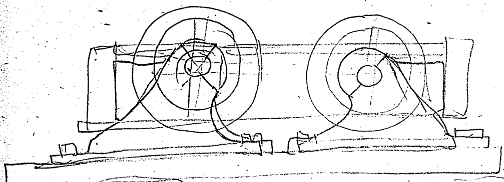
252
249
246
243
240
237
234
231
228
225
222
219
216
3042 inches
72
6084

21294
1728) 219024 (126
1728
4622
3456

$\sqrt{12}$ 144

5580 lbs shaft each

Rim 58000 lbs each



other rigging
Rims 116,000
Shafts 11000
pillowblocks 60000
Bedplate 25000
212000

137
175
50
20
62
7.44

90
12
104
50
154
100
2.54

475

475
28
447

58) 455 (7.84
406
490
464
260

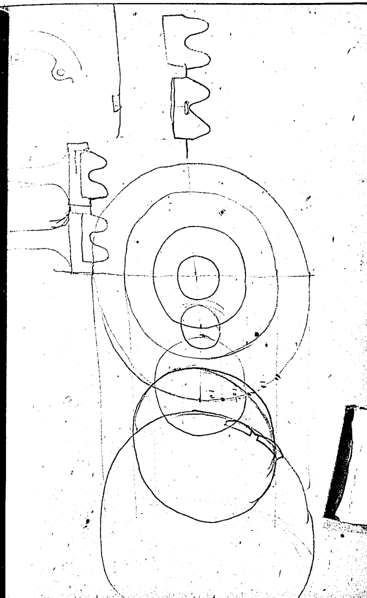
$50 Ton

37 20
46 50
83 7

2240) 190 000 (89
179 20
10 800
20 160

40 000 lbs
160 000

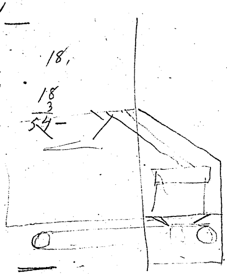
Flywheel 35 000 lbs
Castings 900
4450 -
1600
Detachable plates 2000
Foundation 1500
9550 -
6600
18000



58.8 —

58. 18.

$$\begin{array}{r} 18 \\ 3 \\ \hline 54 \end{array}$$

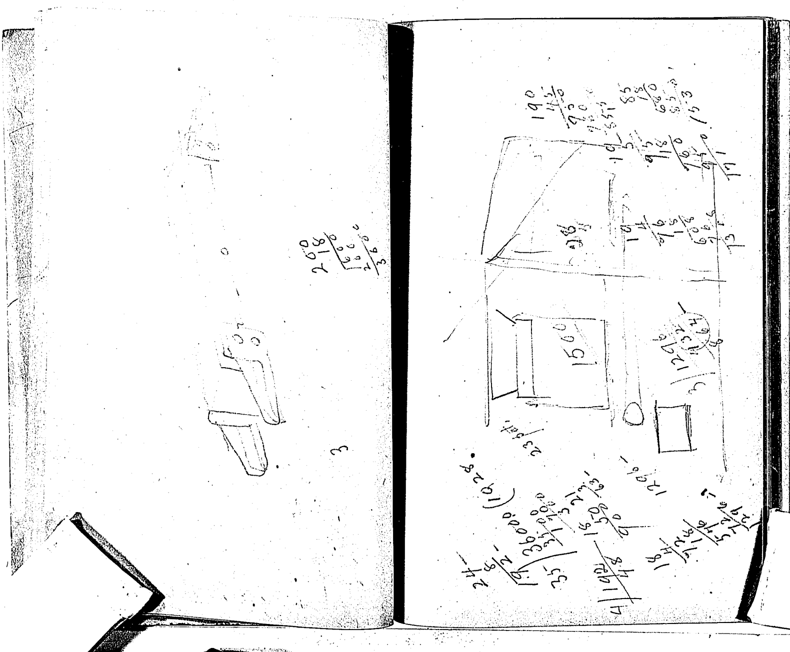


272 —

1600-tons

$$\begin{array}{r} 272 \\ 58 \\ \hline 2176 \\ 1360 \\ \hline 15776 \end{array}$$

272) 16000 (58
13600
2400
2176
2240
48



32
2
64

84

2000

16

1728 | 6000 | 3.4
5184
8160

60
34
2040

135
204
540
270
2889

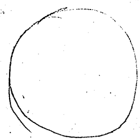
28890
1733
4631

35

3.2

6

275
32
550
825
8800



Coal 1000 —

285 —
120
408 —

15) 38000 (2533 yearly

24 trips

15 pay trips

16

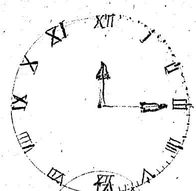
Capt and officers
1st & 2nd officers —
3 mates —
4 Engineers —
12 firemen —
4 watertenders
2 stew —
10 others —
Repairs etc
Provisions & Depot
3660

3000 lbs

2750
240

20160

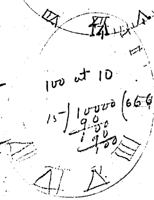
2240



1000
2533
3533
666
4199 —

100 at 10

15) 10000 (666

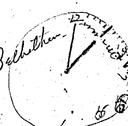


350 —

35 —

175 —

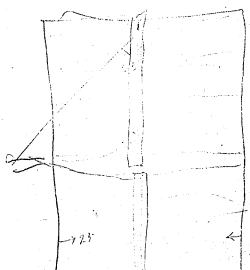
100 —
175
20
295
62
357 — Bellwether

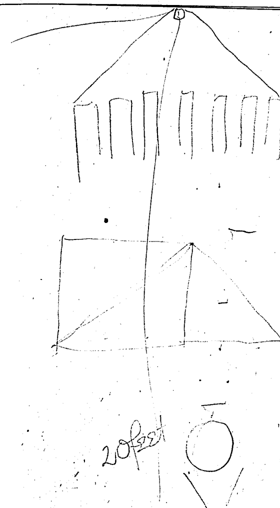


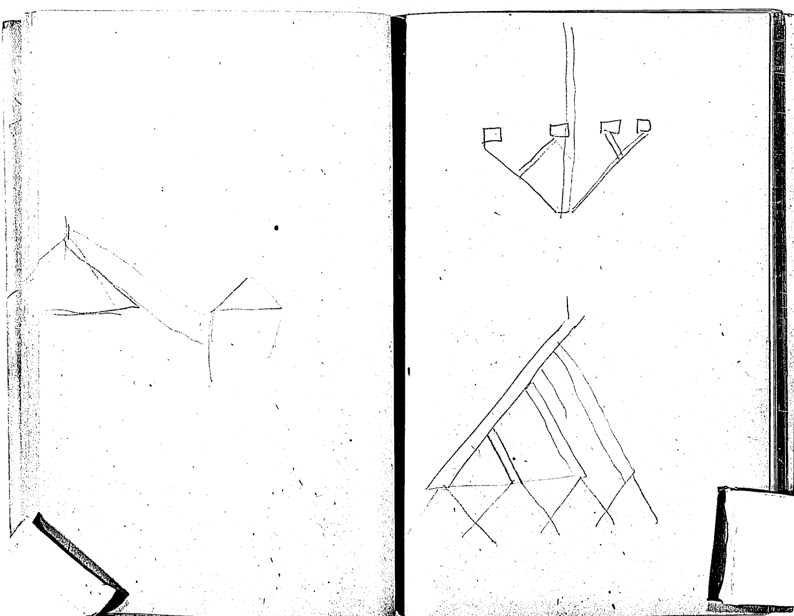
137
175
20
62
75
469

60) 469 (7.8
420
490

378
357
21


725


20feet



2240) 15336 (6.84
13440
1960 — 1920 — 1790

3200
684
25.16

50% effcy of screens
10% effcy of Rolls —
32 tons not for bells total lifted by Elevator & passed by Screens —

2240
32

15336 —

896
32
792
2688
306%

32 tons comes hourly.

15336 lbs goes through screens naturally leaving 25.1 tons to go through rolls these going through once 10% crushed. gives Elevator 1st. 25.020 — 2nd. 22.50 — 3rd 20.25 tons — 4th 18.2 5 16.4 6th 14.8 7. 13.4 8 12.1 9th 10.9 8th 9.9 9th. 9 10th. 8.1 11th 7.3 12th 6.6 13 5.94 14th 5.35
4.82 4.34 3.91 3.52 3.17

352
35
3.17

391
39
3.52

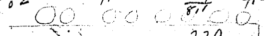
3 rolls from No 1 floor store to screens — 40% stuff in 1280 lbs 50% effcy 640 lbs leaving 2560 to go through screens — this is raised by elevator.

2500
250
2250
225
2025

535
53
4.82

90
9
8.1

482
48
4.34



320

434
43
3.91

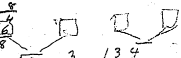
2025
200
1825

2560 whi —
640 fine —
250 by rolls
33% —

32
40
1280

3200
640
2560

1.82
18
1.64
16
14.8



99
9
9.0
121
12
10.9

2560
890 —

3

134
13
25.2.1

148
14
13.4

167

10.9
10
If there was nothing more

504
59
5.35

10 ton feed — 10 tons would be need

660
66
59 2240
73
17
616

8.1
8
7.3

22.4
40
896.0

443 — lb

32 - tons

30672 lbs in it -
15331 goes

25.1 tons goes to rolls - 50%

12.5

32	1st
25	2nd
12	3
6	4
3	5
1.5	6
.7	7

32) 80.2 (3

160
40
2.0

245
277

225
500
1125

80 - 3hp

32
2
64

25 ft

500

2240

245
32
277
256

8.6 times

8.65 - 317
31
2.86

25.00	2.86	2.86
22.50	2.58	2.58
20.25	2.33	2.33
18.2	2.10	2.10
16.4	1.89	1.89
14.8	1.71	1.71
13.4	1.54	1.54
12.1	1.39	1.39
10.9	1.26	1.26
9.9	1.14	1.14
9.0	1.03	1.00
8.1		
7.3		
6.6		
5.9		
5.3		
4.8		
4.3		
3.9		
3.5		
3.1		
225.2		

19.90 tons
225.2
245.10

32) 245 (7.6 times
224
210

33000
60
1980000

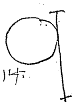
1950m | 28,000,000 (14.1
1,950,000
8500000
7920000
580000

38 hp

1600
500
33000 | 80000.0 (2.4
66000
140000
132000

35

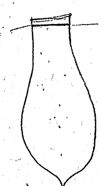
r/2



14 14

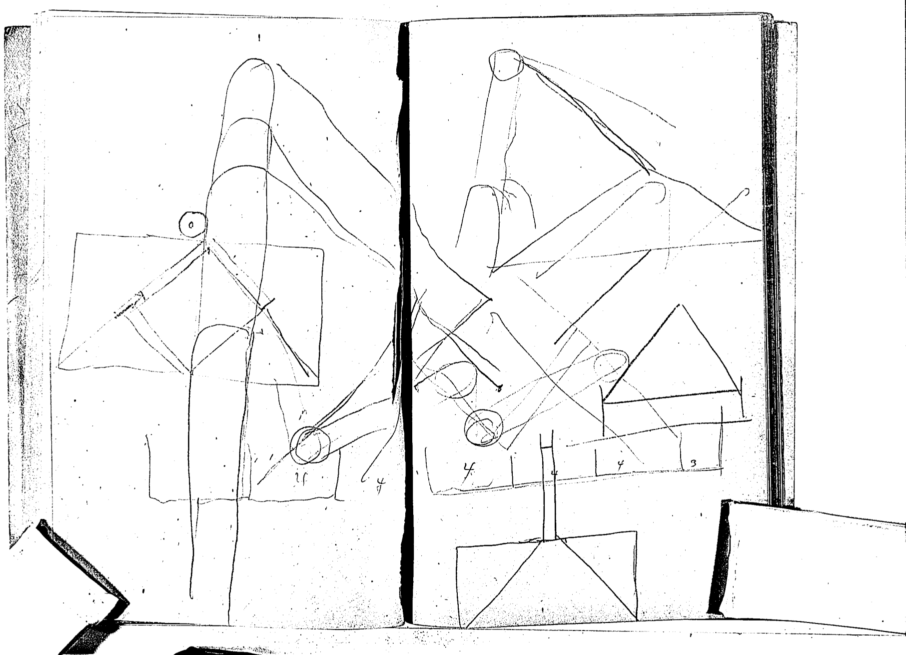
.35

1/4 500
250
1/4 125

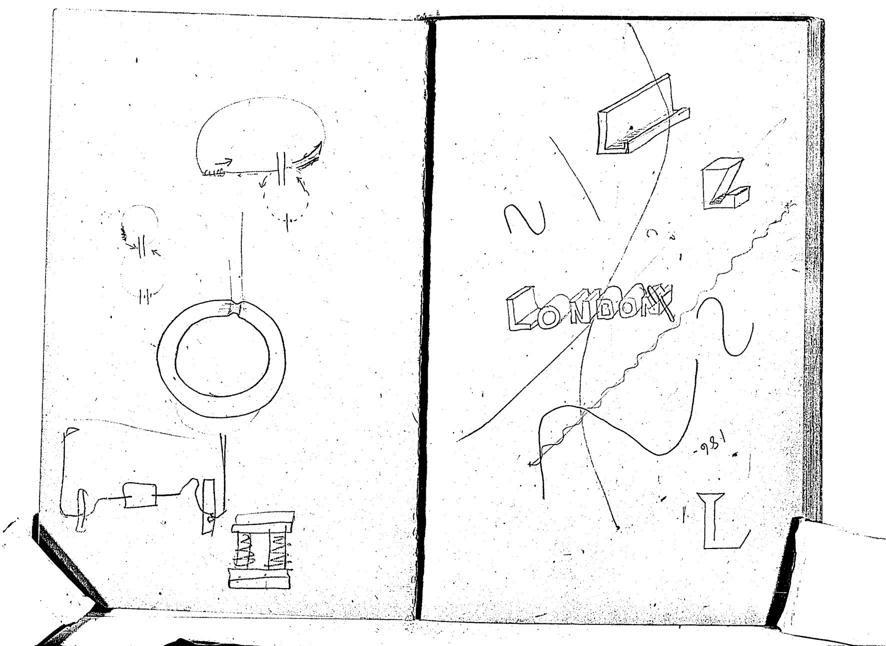


82 — 94.0326994
.0329604
62 — 118

621
.1253

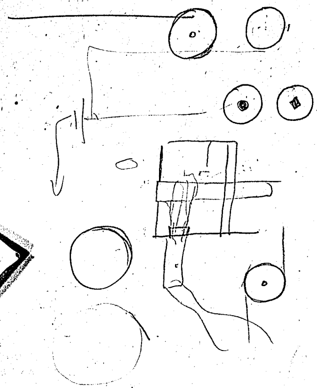

4
4
4
3

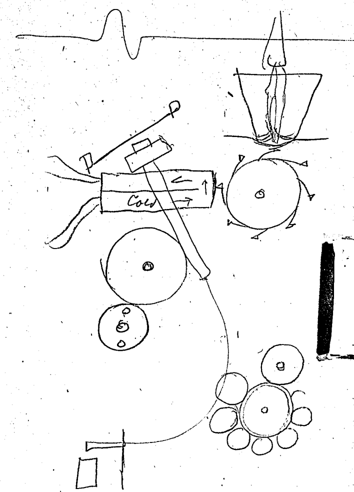
[THIS BOOK WAS USED IN BOTH DIRECTIONS. THE FOLLOWING PAGES WERE FILMED FROM THE BACK END FORWARD.]

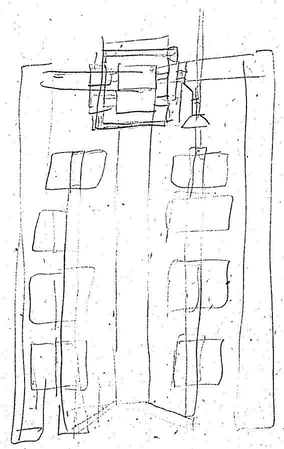


5000 3

3 × 5000 = 15000







30-00 2240) 6720 (3.
6720

3 tons

4 ton 10 cwt

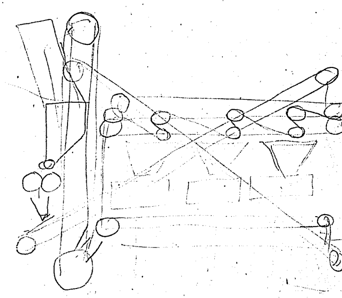
2240
30
6720

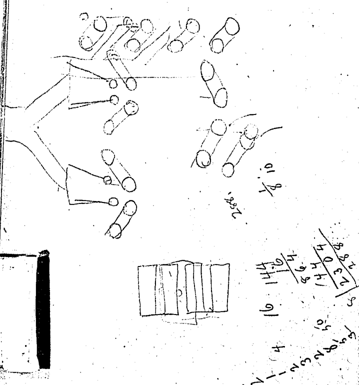
3

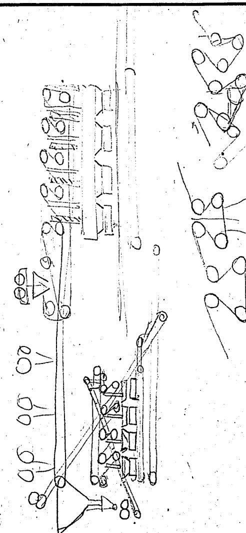
10-

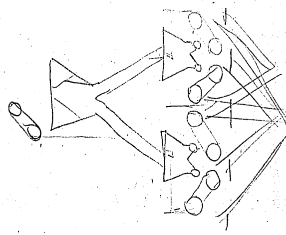
2240
4
8960
16

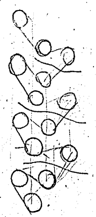
2240) 53760 (2.14
4480
8960











10 - 800
2400 ton

$\frac{300}{6000}$ 20

33
3
99

$\frac{100}{2000}$ 20

16   4 | 17

2 | 58.6
29.3

16.82
4.00
4 | 12.82
3.20
9.62

4 | 3.84
.96

3 | 3.77
1.25

Drilling, piecework 80 feet day costing only as much as 60, saves 4 Cents ton Conc

If big rolls made cost drilling per ton say 25% less - hence saves 3.2 Cents ton
if the 2 boiler men are included their saving be more, 5

Blockholing now 2.27 cents reduced 30% — saving 1.12 Cents,

Loading 58.6 by rip-raping loading should be reduced 50%. as there will be no sledging + 1 @ 3 tons loaded at once, saving 29.3 C

Repairs mine machinery now 3.84 c diminished Drilling + bulk handling ought to save 25% hence .9 of Cent

Material now 3.77 I suppose this is skip now Drills hammers Chisels - bulk handling less Drilling by reason of rip rap work + no sledging should reduce this 33% hence saving 1.25 Cents

4 | 3.84
.96
2.88

3 | 3.77
1.25
2.52

2.27
50
1.77

3.10
1.13

3) 1627
5.42

54.24
5.13
59.37

Coal 3.10 is cost now -- with the Climax this should be less say .33% — Saving 1.3 Cents

Explosives - if we rep rap. the explosives should be 33% less hence saving 5.42 Cents its now 16.27 -

Stripping now 9.75 probably hereafter be about 2 cents - Saving 7.75 Cents

Total Cost Sept. $ 114.46 per ton Conc

Saving	
Drilling	7.20
Blockholing	1.12
Loading	29.30
Repairs	00.90
Material	1.25
Coal	1.3
Explosives	5.42
Stripping	7.75
Saving	54.24

114.46
54.24
60.22 possible cost.

310
1.30
1.80

3) 1627
5.42
10.85

8^{30}

16 | 161 | 10

584
200
3.84 00

Cable.

Repair labor with new cable & proper solution of the button difficulty should not exceed 2¢ ton was 7.13 in Sept

saving - 5.13 Cent

Total Cost Sept	22.69
Saving	5.13
possible Cost -	17.56

Mill 1 — All Crushers - Labor Operating

in Sept. 5.84 per ton Conc

by Roller feeds on both outside crushers as well as inside, there will be 4 men on each shift saved at 1.25 for 8 men is 10.00 Cost of operating say 2 men each shift at 1.50 $6 ~~[illegible]~~ man under large Crusher 1.25 both shifts 8.50 is a Crusher foreman necessary if so is it necessary on both shifts. if we average 1800 ton crude per day. Then cost will be about 2¢ instead of 5.84 saving

3.84 Cents

$7\overline{)330}$
47

15
20
300

~~Say repairs labor same 1 cent per ton~~
Concentrate. Say all other items same
by putting small outside Crusher on mill
save 5 hp save 50 cents per day
or $\frac{1}{8}$ of Cent ton Conc

Crusher Oil now 2.46 ton Conc
I feel sure I can clean & filter this
& save 75 per cent say labor would
save 1/2 — Saving 1.23 Cents
perhaps grease cup principle
Can be used if so assumed
save nearly all of this item

1/2 & 1 1/2 Screens. As one new
screen was put in & much repairing
was done on old ones & the fact we
are ~~two~~ now Steel I think a saving
of 4.15 Cents is sure it was in
Sept 6.57 — hence saving 4.15 Cents

23000.

1454
469
9.9

1.25
900

249
12
2.37

.12

3

Rolls Mill 1

Labor now 1.70 - by rods for quick stop 1 man only necessary hence saving .85 of Cent

Labor repairs outside wooden teeth which I suppose is putting on + taking off shells, now we can certainly design rolls which will only require 4 man 1 hour supposing we changed a pair per day cost would be at most 75c or 1/8 cent making saving of including turning in shop 2.77 cents

Material Costs Sept 14.54

now a pair of $300 chrome rolls will certainly ~~crush~~ 3 pass through 100 000 tons + as not crushing in Mill 1 showed never be less than 25% of amount passed through hence cost of material would be about 1.15 per ton crude ~~the~~ or 4.60 per ton conc, ~~........~~ to say nothing of fact that 25% of all the ore dont go through rolls but through Dryer + is screened out, hence saving on material will be 9.94 cents

1454
994
460
419

Wooden teeth. With Labor cost
7.24 cents now this can be
Entirely prevented by a breaking
block which Cost nothing practically
hence only natural wear of teeth
& pinion which should not exceed
1 cent per ton Conc hence
saving 6.24 cents

Driving machinery Mill!
Labor .9 material 5.65
What is this .5. .90
6.55

Conveying Machinery Labor now
4.39 say this Labor is ok
but investigate - Material
9.99 - this includes the new 36"
belt, now the old one has done over
100000 tons so the Cost per ton
Cant exceed 1 cent per ton Conc
& assuming most of this item is for
belt - we may on investigation
find saving of 7 Cents

Costs in Mill 1 now 85.37

Saving

Labor operating all Crushers	~~5.51~~ 3.84
pulling motor Con mill	0.12
filling Crusher oil	1.23
1/2 & 1 1/2 Screens	4.50
Labor rolls	0.85
Labor repairing replacing	2.17
Material	9.99
Wooden teeth	6.24
Conveying mac	7.00
	35.94

Total possible saving

85.37 now
35.94 possible
49.43 - Cost

15

7 | 67
2.2

447
160
2187

1500
12
3000
3000
1500
18000

1500
20
30000

30

50
300
15000

50000

Mill 2

50 mesh screen - by new method
The saving in power showed more than
pay for whole cost screening
now cost 14.41 hence ~~14.41~~ Cent
saved

Rolls - Experiments with heavy feed
which new screens will permit gives
20% net of ore passing through.
hence assuming Chrome rolls + Easy
removal we have 100 000 passed
20 000 net cost $300. 1.5 Cents ton
of 41% ore. or 2.2 cents per ton
Conc a saving of 4 Cents

Labor Repairs are 1.07 saving probably
not less than 66% say .6 Cent.

Belt seperator. if they dont split
assuming 1/32 poor rubber on old + 6 times
~~that amount~~ on new belt with twice
wear capacity + non buckling crowning,
+ assuming old belt did 1500 tons conc only
then new will do 20 times this or say
1.6 cents saving over 4.47 now
2.87 cent

1250 [illegible]
900
1200
[illegible]
[illegible]
[illegible] 800)412500(1

350)4200(1 10.
3500
0

350) 5000(1.4
350
1500
1400

24 28
13 00
11 28

If we substitute small bar mag
we save 190 horse power & there is
practically no repairs but there is
some loss of iron in dust figure this
& make a ~~better Estimate~~ -

The Repairs in Sept. 9.02 but this
was for staggering, hence in reg
work probably be not over 2 cents
hence 7 cents saved

Oiling Labor 4.33 think 3 oilers
not necessary but as mill will
do very much more saving
should be 1.3 cents

Power is 76.65
allowing ample for Labor & only averaging
350 tons Conc it should be not more
than 13 cents per Conc instead of
24 28 saving 11 28 cents

7.5
7.5.0
62.5.0

12

350 | 8200 (23.3
700
1200
1050
150

3581
2380
1201

3 | 575
191

2 | 565
282

Power allowing 350 tons average of Coal
+ 25 ton bolt shafts. Costs
would be 23.3 instead of
35.81, saving 12,51 Cents

Oil is excessive should be
saving by increased output
only ~~to~~ say nothing else of
33% - Costs now 5.75
Saving 1.91 Cents

Office - all books charged in one
month instead of over several
~~D~~ Now for material in Sept 5,65
Reduce say 50% Saving 2.82 Cents

16

575
191
3.84

2500
2000

2

1200
3

160

16
6
10
4
14
70
6 | 11

Sawing Mill 2' Cost Sept
53.61 Cents

Sawing	\$
	14.41
Screening	4.00
Rolls	0.60
Repair rolls –	2.57
Belt Sep	7.00
Belt Sep Repair	1.30
Oiling Labor –	
	30.18

\$

5361
3018
2343 Cost

Power - now 76.65

Labor saving	11.28
	12.57
Coal	1.91
Oil	25.70
	2.82 saving
Office —	

7665
2570
5095 saved

25000 —

24

350
300
105000 | 2500000 (24
2100000
400000

6000 —

5000
1200
1200
3000
8000
2500
3500
~~3000~~
24400

432
675

Mining	60.22
Cable	17 56
Mill 1	49.43
Mill 2	23 43
Power	50.95
Office —	2.82
	205.41
	55 00 left off
	1/2 2 00, by 1/3 ...

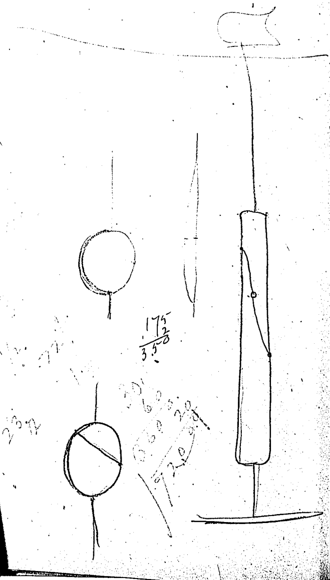
If we put increased output to diminish genl expense & other items I have not touched it will pay the cost of big rolls + new dryer + accidents.

Now	260 —
bricking	35 —
Roylty	45 —
	340.
	24 . Cents for all other Exp
	364. is total Cost bricked

on car + ~~it~~ must be done

	Mining	114.46
	Cable	22.69
	Stable	5.87
Mill 1	Crusher	15 40
	½ Screen	6 57
		18 73
	Rolls	7.24
	wood	6.56
	Drying	14.38
	Conveying	1.95
	14 M	2 41
		7 28
		4.82

Mine	143.02	59.37
Mill 1	85 37	35.94
Mill 2	53 61	30.18
	76 65	25.70
Electrical & office	29.00	
Blacksmith etc	2 87	
	38 99	
Mill foreman	429 51	



175
2
350

350) 13350 (38
1050
2850
2800

350) 11300 (32.3
1050
800
700
1000

300

$7000

4650
2300
3500
3600

Bricking –

25
15
6
46

Material	22.00
Labor on material, Steam &	1.00
2 mixermen –	

350
22
700
700
7700

7000
8000
2500
17500

350 tons output

Material 22¢ per ton	77.00
Labor & steam making material – ~~8~~	4.00
2 Mixer men night & day	3.00
8 loaders day & night	10.00
2 Car men brickyard 1 night 1 day	2.50
2 foremen day & night	3.50
2 firemen, boys –	2.50
4 unloaders night & day	5.00
4 men in cars loading	5.00
2 Climax Eng & firemen	5.00
Coal for Dryer	7.00
proportion for power climax	9.00
	133.50

100000) 1750000 (17.5
1000000
750000
700000
50000

350
280
28000
7000
98000

Insurance

100000) 2200000 (22
2000000
200000

20000
15000

3

Cable –

12,00
6 Engrs 6,00
4 Skipmen 3,50
2 foremen 350
2 Repairers 4.00
4 Signal boys 2.00
2 Car boys –

Crusher – 6,00
4/7 outside men 3.00
2 under men
~~2 [illegible]~~

3.00
Rolls 2 men 3.50
2 oilers 350
2 bin train watch
6.00
4 Dryer men 7.50
4/7 Bar men 5.00
4/6 Laborers 5.00
2 Carpenters 5.50
2 Crusher foremen 6.00
2 foreman

Mill 2 –
2 Rollmen 300

8800

	88 00
6 oilers	9,00
2 Screen men	3 00
	500
4 Laborers —	350
2 beltmen	6 00
2 foremen —	500
2 Carpenters —	350
2 . watchmen	400
2 timekeepers —	

Engine —

	10,00
4 foremen	250
2 Laborers	500
2 French Engrs	250
2 Boys —	3 00
2 Engrs McGin	
Mill 2	
	500
2 Engrs	250
2 Boys	
	250
1 Repair Engr	500
1 Chief	
	165.00
	3.50
50 mech Engrs —	168.50

168.50

[illegible]ley	25,00
[illegible]	8,00
[illegible]ith	2,50
	4,00
boss Storekeeper	3,00
[illegible]man	5,00
[illegible]say	4,00
[illegible]machineshop	27,00
[illegible]lacksmith	9,00

	5.00
[illegible]max	10.00
2 Loaders	2.50
2 Car men	2.00
2 fireboys	3.00
2 mixers	4.00
2 foreman	5.00
4 Unloaders	5.00
4 In Car	
	4.00
Skip repairs — 2	2.50
Chemicals	296,00
	5.00
2 Carpenters	301.00

296.00

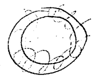
Notebook, N-92-03-30

This notebook covers the period March-May 1892. At the beginning of the book are entries by Edison and Arthur E. Kennelly regarding various electrical experiments, along with theoretical notes relating to dynamos, dielectrics, electric lighting, and magnetism. The remainder of the book contains notes, drawings, and calculations by Kennelly and by unidentified Galvanometer Room experimenters pertaining to differential dynamometers, transformers, batteries, and a 3-wire electrical distribution system. Transcriptions of the Galvanometer Room records can be found in Arthur E. Kennelly Notebook #6. The spine is labeled "135." The book contains 197 numbered pages.

Only the Edison material has been filmed.

N-92-03-30

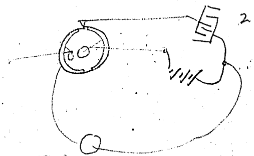
XE-172



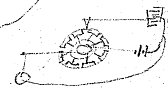
Saturate the ring to 40000 lines per scm. then wind over the saturating system a primary & secondary or primary alone & ascertain self induction working down & up between 25 & 40000 lines -

Determine Vibrating periods of different magnetic materials see if law hysteresis is function of Elasticity

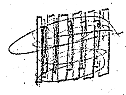
60) 500 | 8.



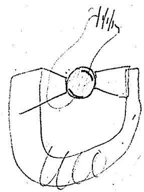
2 mf - 500 volts



ascertain
Value Current.
about 40 blox
— Commutator —



To thus heat given off in
alternating through a
Storage battery



20% SO_4 + Water
will [illegible]
[illegible]
or what?

Wonder How hysteresis
Curve would be with powdered
iron + melted glass mixed
75%. 25% glass.

account for 3/16 blue
spark on big jumbo

(9)

See if there is any Change of Res or Cp in glow Lamp in any position in Magnetic field —

Vibrate filament by outside magnet that is worked by vibration & strike the vibratory period of a glow Lamp filament at Red & then find out the Curve of Change in the vibrating period by rise of Cp —

Statement Made that an incandescent Lamp burning near a Elect. (?) belt went up to great brilliancy several times & then went back to normal.

(11)

Leyden jars are imperfectly made ~~a plat~~ shellac is used How would it do to use tin foil & Hg as with mirrors or by Vacuum process

Dielectric are the opposite of Magnetics in every? analogy -S!

All Electro chemical process follow that of dielectrics

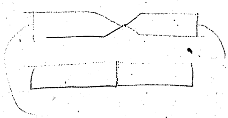
All sources, Electric of Energy tend to take that path in which the greatest amount of Energy can be transformed into heat, S

(13)

Radiant heat from a given source recd on one side of a metallic plate gives motion to the atomic systems of the metal & so given out on the other side at different periods or rate than the original depending on each particular metal

All matter whose atoms motion are periodic with some pitch in radiant Energy - absorb all other periods & Emit only the particular vibrations periodic with its atomic system

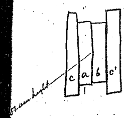
hence thin films of metals should give the pitch of the molecular in terms of the Spectra periods -



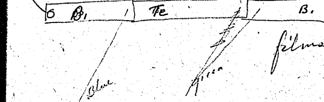
for Dark box use

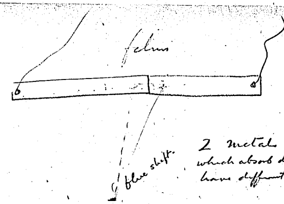
one single turn and put on all the amperes it will stand ~~push~~ so as to get rid of self induction + length of arc — perhaps the single turn could be put in circulating water —

As it cannot be supposed that Se + Antimony actually touch when held tightly together then ultra showed permit of a Current by its action on the surface + by the heat absorbed - the latter being direct source of Energy + Ultra waves rate the Conductor to permit of Conduction across air space



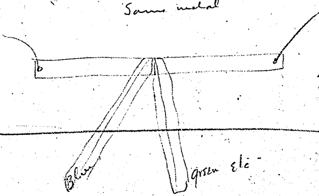
c c metal a.b. dissimilar transparent dielectrics such as glass fused phosphoric acid — idea is beam of light resolved into heat at juncture & Electrify the Electrometer from c c'.



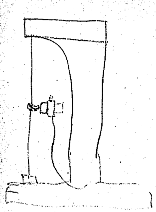


2 metals
which absorb dif or
have different Color

Same metal



absorbs one not the other or with variations



With Sb point, and Te anvil
deflection as high as 10 in
direction indicating cooling.

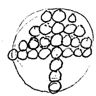
C point
Pt " } both 5 divs indicating heat.

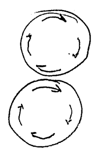
Platinum plate dark purple
clamped to electrode plate
Res 75, 100 ω
When back of clamp plate
warmed by spirit lamp, fell
to 26.000.

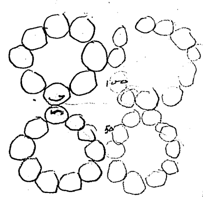
Notebook, N-92-04-16

The one dated entry in this notebook is from April 1892. All entries are by Edison. The book contains extended theoretical notes relating to gravity and other astronomical forces, the nature and structure of the solar system, and the transmission of light waves and electrical energy. Also included are notes, drawings, and calculations regarding electrical experiments. The pages are unnumbered, and several pages have been removed from the book. Approximately 30 pages have been used. Four loose pages have been inserted into the book.

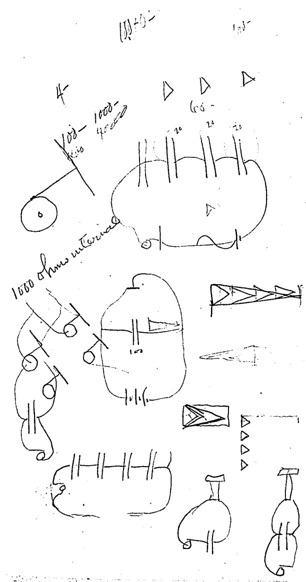
92-04-16

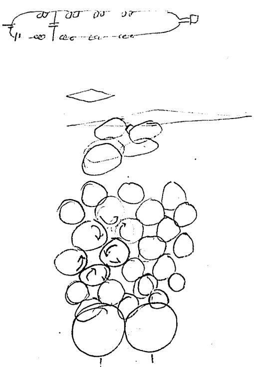






92-0





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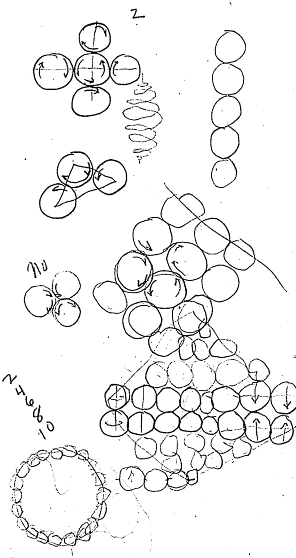
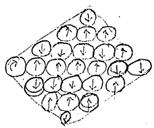
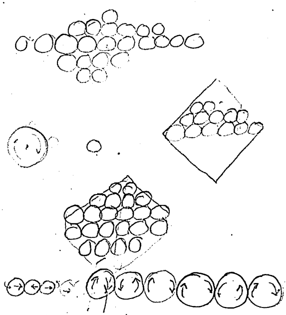
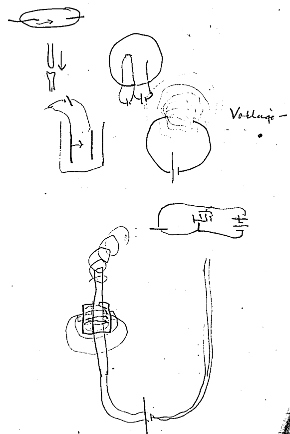
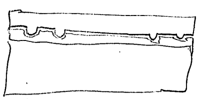


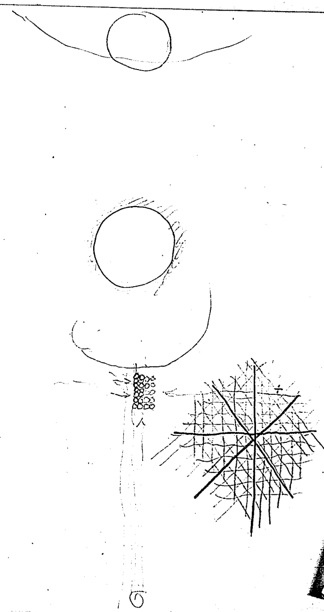


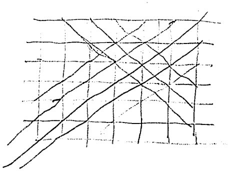
1
3
5
7
5
3
1

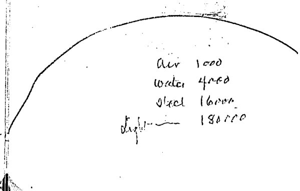


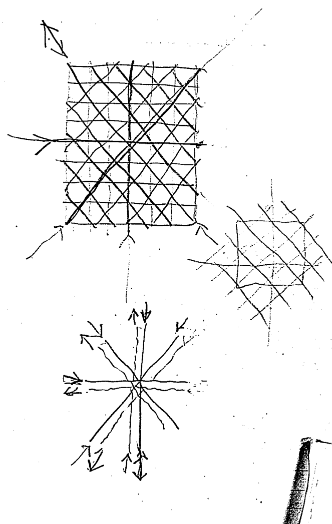









Air 1000
Water 4000
Steel 16000
Light 180000



1430 ft second

1000

24000

5000

84000) 120,000,000 (1430

84000

180

>179

1000 miles
Extra = 1 lb
pressure

84000) 120 000 000 (1428 ft second

(17 miles a min

1430
60

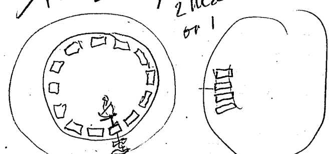
5000) 85800 (17

3580

April 16 / 92

A02

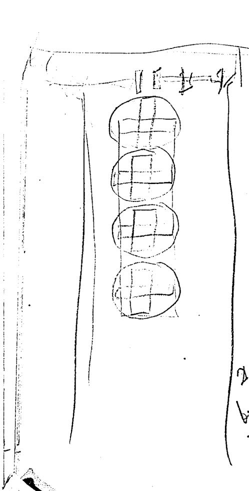
2 machs
or 1



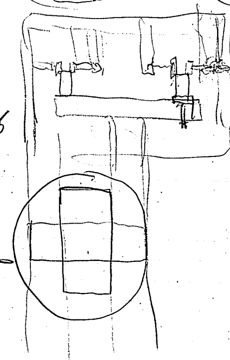
old floor

2 men – 7 inches
both sides
30 cells hour

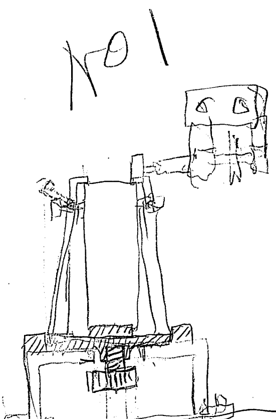
other edge 30
makes 15 cells
hour
7 planks
~~30 cells/hour~~

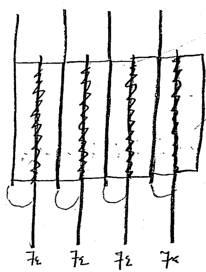


5



15 cells hour
8
120 – 1 shift
240 2
360 3 shifts





4 Elements - or pairs
8 Asbestos
2 Asbestos to pair -
80 asbestos 40 pair
720

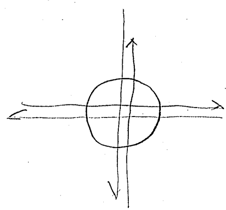
Teddy come to me
Here is your breakfast
The bird will want you to
feed it.

Birds sing on the tree

Birds feed on the bough

the storm is rough some times

We go through the gate to the
garden



If our world was suspended in space, away from all matter like the sun & planets and neither revolved or moved in space and the primodial bodies moving with a velocity of say 600 times the velocity of light & equally in all directions and these primodial bodies lost a percent of their velocity in passing individually thru the earths matter - it would produce the attraction of one piece of Matter for all other piece of fixed matter and account for the ~~att~~ so called attraction of Gravitation,

~~[illegible]~~

If the earth increased in size or density the retarding or velocity of the propused particle would diminish & the Earth would get hotter deriving the energy from these particles

hence a large body like
a sun would be supplied
perpetually with energy
+ in proportion to the
density or size –

If these primordial particles
went in straight lines in
every direction – + equal in
quantity – there would be
no tendency for the
Earth to advance or turn
or drift –

Now suppose the earth was in motion say at the same speed as it now had in its orbit around the sun -

It would proceed in a straight line -

Supposing 2 or 3 light years ahead was our present sun several hundred millions of miles to the right instead of 92 million as now -

If it suddenly appeared in this position the earth would be affected + could not proceed in a straight line because the stream of primeods would be disturbed, a beam of primords passing thru the sun would have their velocities changed would be slower and when these struck the earth it would no longer be evenly bombarded by primords all at the same speed, those primords coming from space on the opposite side to that where the sun stood would have full velocity & that towards the sun lessened velocity hence the earth would be pushed towards the sun, not attracted as by the present theory

the result would be that ultimately the earth would travel in a very extended orbit around the sun, and this orbit must necessarily be Eccentric - Also as time goes on will have an orbit gradually diminished in Circumference & ultimately will ~~pass~~ into the sun not by attraction but pushed in =

Ultimately all our

plants will be forced into the sun

All matter is built up from these primoids by Collisions + Coalescing - ~~[illegible]~~ The first Combination becomes a Compound + takes on the properties of matter

Light is not carried by these Collision Complexes until their speed falls to approximately around 185 000 Miles a second then the complex can

be impressed with Vibration
~~#~~ like a Diaphragm
it can have impressed
on it the vibrations of
any other matter like
Sodium Lithium etc

The stream of these
Complexes passed thru
Sodium Vapor have
impressed on them the
vibrations of the Sodium
atom + these complexes
Stream thru space +
striking the earth matter
receive these impressed

Vibrations & we see the
sodium line in the spectroscope
The so called wave lengths
has no existence —
Light may travel
186 000 miles per second
but its not necessary
to suppose that it
Comes on the socalled
Ether & be figured in
wave lengths as these
primodial Complexes
travelling at same
speed May have ~~the~~
Vibrations impressed on
them which are

a million times slower than those figured on the Ether & wave length system —

and these complex. can carry any kind of impressed vibrations — & we get over space all the vibrating rates of all the metals etc. as seen in the ~~Spectroscope~~

(Note, The light carrying complex gives light waves by its vibration impressed thereon and as the amplitude diminishes it ceases to give light & then gives radiant heat but only because of diminished amplitude

Incandescent bodies giving light Even a candle has all waves & rates of vibration even when weak but the ultraviolet we cannot appreciate being too weak but rise of temp increases their amplitude & we are then enabled to know of their presence. Rise of temp simply increases amplitude —

Light goes in straight lines apparently the carriers of the impressed vibrations actually pass thru space & impart their impressed waves on the particles to all fixed or semi fixed bodies -

But Electricity & Magnetism apparently always move in circuits - not in a straight line - hence the methods of transmitting light & radiant heat Energy must be quite different

Can Wheatstone's measurements of Velocity of Elec be anywhere near correct.

I believe Elec Energy has not the speed of light Energy

there must have

been some large
source of error in it
in fact he made it
faster than light
which is unexplain

$13 profit

18
200000 · 3600000
3600000 · 2000

216000

250
400000
1200000
10000000 / 2 = 1500
2500000
150000
450000

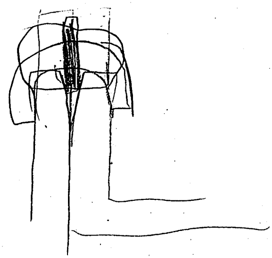
13 5000000
5000000
2000000
3000000
1500000
1000000
3500000

15

1800
12
6
3
18
6
21

150
170
10500
150
2550
8,000
8

120
15000085
1500000
1200000
1217501



[ITEM FOUND IN BOOK]

(1)

The Corpuscles which carry light is a compound of the ultimate entities brought about by collisions — probably there are from 2 to 4 particles which have coalesced

These particles are slowed down to 186000 miles second

They have a natural vibrating time near ~~that producing~~ the Sodium line

(2)

or a multiple of ~~that~~ ~~time~~ — but of ~~course~~ Can have any rate of Vibration forced ~~or~~ impressed upon them

The Entities - striking matter like a mote absorbs the vibrations ~~&~~ ~~transfer it to other~~ light carrying entities which ~~of course~~ pass through space

[ITEM FOUND IN BOOK]

3

in all directions
The motes as compared
to the ways of the Light
Carrying entity are
large pieces of matter
They absorb the vibration
+ dampen it the Light
particle proceeds
without any or very
small impressed vibration
amplitude of the
mote is opaque + with
considerable of transparency

4

In the case of a Column
of water. The vibrations
impressed on the light
Carrying particle is
~~Entirely~~ absorbed below
the vision point in perhaps
50 feet, but the light
Carrying particle still
has high velocity +
penetrates to unknown
distances into matter

Notebook, N-94-12-11

The one dated entry in this notebook is from December 1894. The first page bears the inscription: "Mr. J. Coote Edisons Laboratory Orange, N.J. Dec 11th 94." All remaining entries are by Edison and pertain to squirted filament experiments, with notations for boxes numbered 1-20 and brass boxes numbered 1-8. Near the end of the book is a page entitled "Index," which has no apparent relation to the preceding entries. The front cover is labeled "Various Experiments By Mr J Coote." The pages are unnumbered, and several pages have been removed from the book. Approximately 35 pages have been used. Two loose pages of calculations have been inserted into the book.

N-94-12-11

XE-172

W. J. Doole

Edisons Laboratory
Orange, N.J.
Dec 11th 94

No 1 Box

Contain. Ayls file Cbzd in
Hg above 700 called 2nd Cbzn
because files only crack in
flame + don't ox after pulling
out as first Cbzn in Hg did]
The above files were heated
in an oven to 550 fahr +
dropped Vertically in the oven
into Carbonite dissolved in
Alcohol —

Box No 2

2nd Hq Cbzn then film
put in oven + when 430
dropped into Carbonite
dio in Dipi

Box 3

Files Carbonized in Paraffine to 450 deg fahr —
These files brought up in oven to 450 & dropped in Carbonite dies in Dept

Box 4

Carbzd in paraffin to 450 fah

These fils heated in oven

to 450 & dipped in

Syrian asphalt dis

in Benzol-

Box 5

Carbzol 2nd Hq

fil then heated to

450 + dropped in

Syrian in Benzol.

Box 6

Carboy 2nd Hg

fil heated in oven to

550 & dropped in Syrian

in Benzal

Box 7

Carbzd 2nd Hg –

fil heated to 550 fahr

+ dropped in Hoffman ✓

in Mal

Box 8

Carboyd in Parafine -
450 deg then fil
heated to 450 deg
in OVEN & dropped
in Haffman V [illegible] Mal

Box 9.

C6zn 2nd Hg.
fil heated to 550 + dropped in Haffman ✓
in Mal.

Box ten —

2nd Hg Cbgn

fil heated to 440 & —
dropped in No 33 in Mal

Box 11

Clyn 2nd Hg
fil heated to 550
+ dropped in 33. in Mal.
not cleaned well of 33
in none of fils —

Box ~~[illegible]~~ 20

Carbonized In parafine at 450 —

fil heated to 450

& dropped in No 33 in mal

Box 13

Clyn 2nd Hg

fil heated to 450 + —

dropped in Sugar

in Water, Strong cold

Solution

Box 14

Cbzm Paraffine 450
fil heated 450 +
dropped in Sugar

16) 358 (22.375

Box 15
2nd Hq Clgn
fils heated to 550 +
dropped in sugar

Box 16.
Contains files called
1st Cbzn by Hq went up
probably to 700.
they catch fire after
withdrawn from flame
which 2nd Hq Cbzn
dont. — These are
plain files nothing done
to them —

Box 17.

These files are 2nd Hq
Clgn & went probably
to 750 @ 800. They
do not ox after coming
out flame, buck
worm hole somewhat
plain files nothing
done to them —

Box 18—

Contains files
Carbonized in paraffine
up to 450 degrees
plain files nothing
done to them —

Box 19

~~Eight~~ 2 fac filaments

in parafine that has been

under heat several times.

run to 600. + then run 1 hour
after thermometer taken out
probably run to 700 ~~to~~ 750
fils shiny good — Ox after
taking from flame —
5/1000 diameter —

These fils are part of a lot
that was run to 500
taking 4 hours, then
cooled down + one lot
taken out, those remaining
were run up again gradually
as possible to 500 +
held 2 hours, then cooled
off + run again to 600
over these No 19 are
the remaining —

Brass boxes numbered 1 to 8

Box 1 - Brass -

No 1 Contains about 60 fils
small die, 3000 Cbt 500 Crysle
in Ether, shine good spots good,
no stick or slap, but there is
tendency to long Crinkles
~~too~~ there are a number of $\frac{1}{4}$/1000
specs along fils - apparently
no puff - used steam -
die body & jets for little while
to heat Die - These specs
may be due to not stirring the
Cry in Ether as I failed to
do it, I divided the 3000 Cbt
in two doses, This is second
dose laid aside for 6 or 8
minutes Covered over with
butter dish, first dose wasted
as we had too large a die -

Box 2.

3000 Cbt 500 Cry well mixed with ether & enough ether to make whole thin liquid in mortar. Worked it till caked & semi dry then washed out mortar & put it back & worked to dark red powder, was some slight pieces in it. Steam around die & for 1/2 minute short flame to heat die, Squirts good, shiny but tends crinkle at times. Small die, put all the fils from both batches in one box = There are specs on surface of fils but fine & may not hurt, fils don't seem puff-

fils measure 5 8/10 / 1000 average

Box 3

Mixed 6000 Cbt 1000 Cry
+ double quantity 20 cc Ether so as
to make 4 charges for Di-
great tendency to crinkle.
only used 2 batches one
I throwed away this is batch
used, fils have crinks +
some specs + probably little
puffs - but not very much
puff, the puffs are only
in little specs not general
puff of whole filament,

Box 4

is 3000 Cbt 700 Cresylic -
10 cc Ether - this cakes somewhat
in mortar, It crinkles &
requires just as much heat
as 500 Cresy - We concluded
that die, contraction & press
was rough so freddy repolished
them all & the next box
will we hope be better —

5 Box

3000 - 500 Crys

Squirts fine no break but very

Crinky - dont have good polish

think it will stand more

heat on 2nd portion,

2nd portion run plunger right
down before Crissy could get hung
+ used more steam (no flame)
squirted without a break
didnt Crinkle - fils are
shiny but some are not
perfect, we put both lots
Crinkled + not in this box

Box 6

3000 & 500 Crecy
not very good –
Mixed with some that
is good & was cleaned by
Ethes – We find our CbT
is not cleaned with Mal
We must now clean same
with Mall & gasoline it
if we are to get good fi

Box 7.

3000 Cbt 400 phenol.
in Ether - 9 cc. 1st part used immediately
only boiling water around press no
flame only partially shiny
but perfect, no puffs - Limpid fils
squirts perfect, fils not bigger
than die - not crinkled

2nd part also in this box
was dried 10 minutes in air to
drive off all volatile stuff &
solidify - then made much -
Squirts perfect, but slight
body puffs & crinkled,
too much heat, if less would
not shiny & as it was
fils are dull but perfect,
surface = 1st lot, they [illegible] in
sound best of all yet tried)
shrunk in size, don't puff
& are Xtra good over all other
yet tried.

Box - 8

3000 Cbt 300 phenol

Squints good - nuts shiny
Some crinkled - no puff -

Carbzn

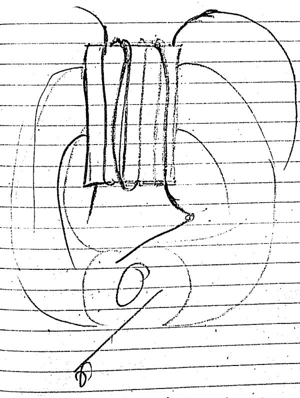
Box NO 1 & 2 contain fils of
3000 Cbt + Crazy various kinds
Cbzd in Castor oil at 550
Dont think they will amount to
much; in Cbzn in oil they swell
& Elongate & break = may get
few out of them - WE washed
them in hot Benzol —

Cbgn

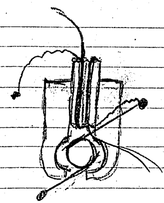
Box No 3 Regular LF fils brought up to perhaps 450 in Castor oil thickened with Syrian asphalt until when cold it was thicker than Molasses - Then washed the fils in Benzol -

Cbzn

Box 4 are 3 lots of filaments made with Cbt purified by Mal, afterwards purified fairly well by ether, then used 300 mg phenol in Ether ground very fine & dry (no longer phenol drying [illegible]) then with slight warmth on body dies & warm squirting die squirted without any pressure squirts perfect, we try these to see how they come out by plain Carbon



Index.



1800
5
9000
14
36

52) 15000 (290
104
460
416

30 Hours 18 perchs

[ITEM FOUND IN BOOK]

CG

1	[illegible]	[illegible]
2	430	"
3	~~Part~~ [illegible]	Par
	450	"
4		
5	450	2nd Hq
6	550	"
7	550	"
8	450	Para
9	550	2nd
10	440	2nd
11	550	2nd
20	450	Para
13	450	2nd
14	450	Para
15	550	2nd
16	plane	1st Hq
17	"	2nd
18	450	Para nothing done to them.

[ITEM FOUND IN BOOK]

gone

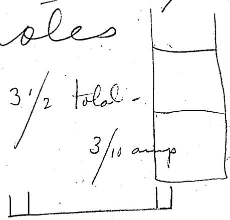
No — 1	70.9	83.5	369	
2	66.7	79.7	377	
3	74.0	85.18	370	
4	74.7	82.9	375	
5	69.8	82.5	372	
6	69.3	81.6	378	
7	68.8	83.3	378	
8	72.0	86.4	381	
1 = 9	65.7	77.3	397	
10	67.5	81.7	383	
11	68.2	81.8	385	
13	67.8	80.0	388	
1 = 14	69.0	81.7	389	
15	69.5	82.3	383	Hours
1 = 16	67.7	79.8 384		123 3/4
17	68.2	84	389	50.5
18	68.1	82	389	
3 ~~19~~		~~77.4~~	396	
2 20	64.9	76.3	386	

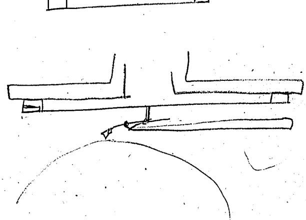
Notebook, N-95-01-24

This notebook contains dated entries from January 1895. All entries are by Edison. At the beginning of the book are notes and drawings regarding the phonograph, including notes and hypotheses relating to phonograph diaphragms and sound reproduction. There are also notes, drawings, and cost calculations pertaining to ore milling. The pages are unnumbered, and the book has been used in both directions. Several pages have been removed from the book. Approximately 130 pages have been used.

X E172 N-950124

Notes

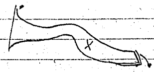




Expt 1

Bore 1/8 hole through floor
& use stretched fine wire
Cop No 36 also thread & test
Dia for Music & speech
a la lovers telegh =

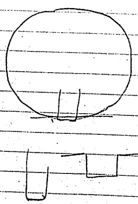
Ear has a resonant tube



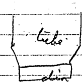
dia dia .350/1000
x 2 inches long or 5.7 times
dia of Drum - if ours
is proportioned, it should be
about 12 long
X is about $1\frac{1}{2}$ time dia - or 1/2
inch - hence ours should
be 3 inches dia this seems
too much try diff dia

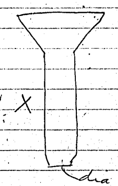
1/2 -

350) 2000 (5.7
1750
2500
2
114



perhaps the thin chamber of
phono which is absent in Ear
Reverberates, hence it would
be better not to have the
Chamber on recording But
a tube 12 long & 3" dia





Reverberations are intensified by
glass & vibrating bodies
hence perhaps a Leather
horn X would be better
so as not to give reverberations

as in all our Expmts
with new Receiver Speaker
etc & the .10 @ 15 high note
Keys failed to come out
The friction method may be
defective in reprodg fine
vibrations & that improvement
should be made on it &
~~all~~ the same records
showing these defects should
be listed with other
reproducers —

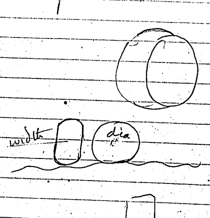
In all long tubes or funnels
Sounds are muffled &
fine notes & speech Even
with perfect Records
fail although speech is
normal through the
Reg speaking tube

Jany 24/95

11

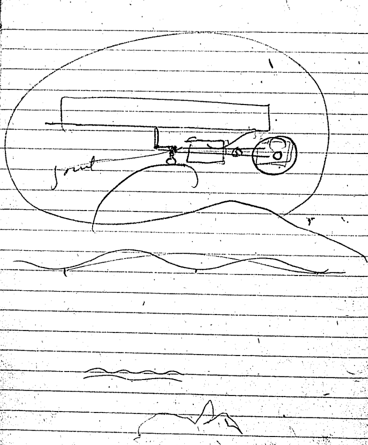
Evidently there is a great
disturbance of the proper
vibtn of the diaphragm,
by the friction of the point in
tracking & its varying friction
during vibration. The more
brittle & less tenacious the
material is the less this
disturbance — as a definite
tracking is required hence
there will be a definite
friction whether the sounds
are strong or weak hence
the friction might be a
small factor with loud
sounds is a great factor
with weak ~~str~~ sounds —
hence the very weak sounds
must have friction reduced
to a minimum which can
be done by light tracking
& better by using a 5/1000
cutter. It is very probable
that the diaphm vibrates
truly to the sound & the

But perhaps the reproducer
Shaped be same Curvature
as Cutter in one way
& twice the dia the
other way if double
speed



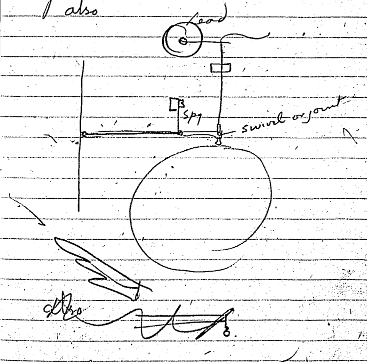
Jan 24/95

disturbance is purely Due to
the friction of the point,
I have noticed that hissing
sounds Come out abnormally
on very hard material
with Extremely light tracking
Tin for instance the hissing
Exceeds the Vowel sounds
400 threads to inch is the
only way sounds from
distance Can be taken &
point shaped be 3 @ 5/1000
dia to get depth without
width
as the friction doesnt increase
with the speed of cylinder
The wearing properties of the
record can be increased
by doubling the speed
Thus we can 1/2 the friction
by taking out 1/2 the wax
chips & at the same time
make total amt of wax
forming and indentation
the same hence the wear
will be same as double width
& 1/2 speed See opp page

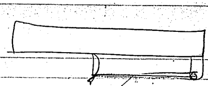


We should try 3 @ 5/1000 glass in reproducer no rings but ground metal.

also



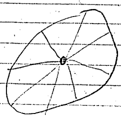
Jany 24 1878

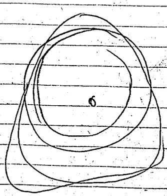


This probably should be
wood to lighten — perhaps
whalebone vulcanized fibre etc,

The Expmts should be made with glass
hard recording points,
adjustable as to angle easily
say shellac to hold the wire on
side — & wire 1/8 @ 3/16 long to
facilitate adjustment,

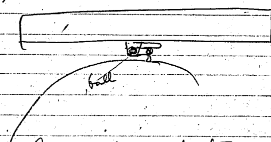
In recording as well
as reproducing the
diaphragms probably
want to continue vibrating
after the waves have ceased
or a fundamental having
ceased the overtones want to
continue & louder than they
should hence a big
feather dampening finger





Jany 24 1895

might be of use in each

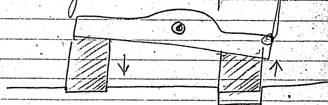


Ball joint with friction
Spring strong enough to overcome
friction Hence Eccentricities
of Cylinder OK but Reg vibs
given to dia - if friction
insuffient uses teeth so
lever must move exp-inclive
to change relation

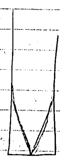
Note an oval dia
So that distance to ring
is everywhere different
from the Center where
point is fastened

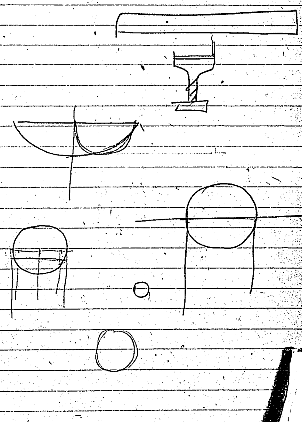
Jany 24 1895 Dra

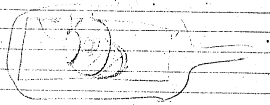
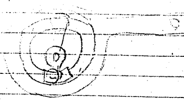
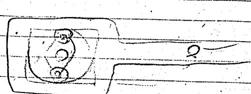
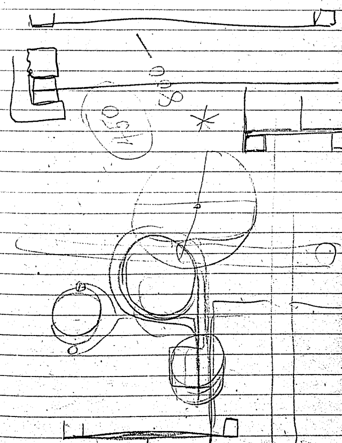
to make a perfectly Even friction at Cutting point it might be arranged thus

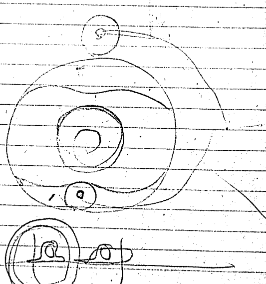


Adjusted so one is in as other Comes out,
This has the advantage also that the reproduction is a positive movement cant jump & it may be important as record will not be ~~work~~ worn much & very small recording points used to diminish friction







300

600 –

900

150

600

120

1200

600

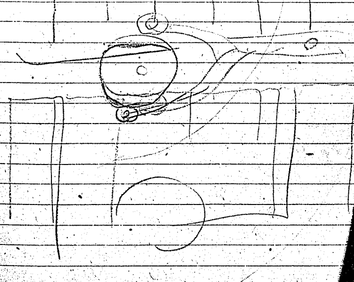
7200

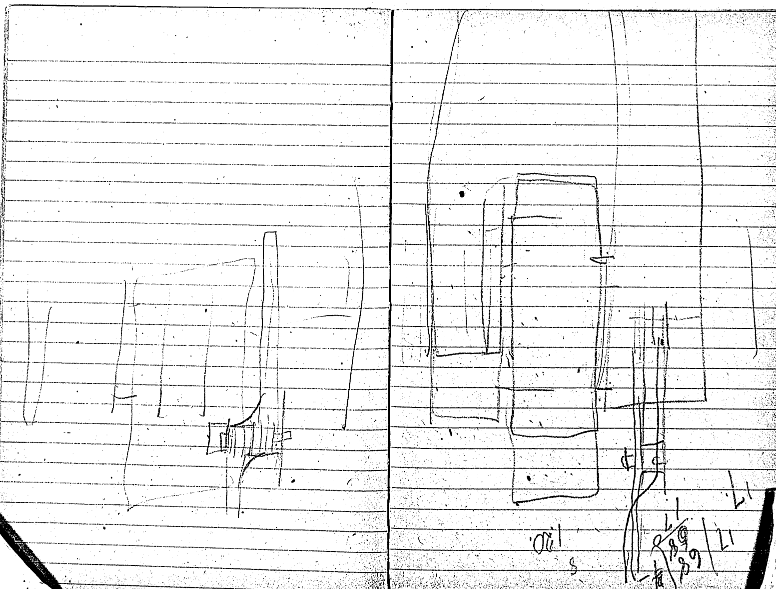
9)

40) 8000 (20

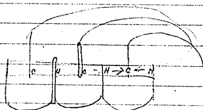
800

40 –

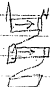




1
2 8.
3 7
4 2
5 20
6 5
42
25 8000
160
4000
25
[illegible]

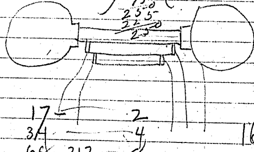


~~13 to Volt~~



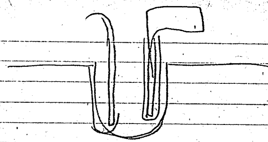
225	15
450	30
900	60
1125	75

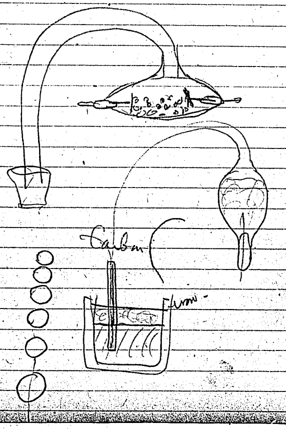
75) 1000 (13,3
750
255
225
25



17 — 2
34 — 4
68 212 — 8 180
136 = 16 43
8 times 75 223
32
43

16% Efcy
8 times





40
27 8 tons hour 3500
5
175 00
60) 16000
1200
4
40
400
(265
715 000
68 000
783 000
13
700
150
26 36 2000
2500 2000
5000000
Belts
20 700
1400
6) 400000
66,666
4500
2000
2500
2001
194.000
60 66000
130
150
50
500
125
500
3
130
3000
3/3
1 mile runways
52000
250
250
250
250
150
300
~~600~~

5 2500 tons @ 80 ton Erected,	200 000	50.000
Corrugated sheets	30 000	10 000
Steam shovels	28 000	7 000
Engines - 3 allis + pumps -	58 000	18000
Boilers.	18 000	3.000
10 Roasters	120 000.	70000
Motors	14 000	3000
Dynamos	10 000	3000
Cincinnati Eng Dynam	7 500	
Machineshops -	25 000	-6 000
Dryer.	7 000	2000
6 36" Rolls	25 000	8000
1 5 ft Roll	9 000	3000
6 3 Highs -	24 000	8 000
Runways & Belts	52 000	12 000.
Other belts.	17 500	4000
Clinker scrapers		
2700 ft scrapers etc @ 6.	10 200	4000
Screens & frames	10 000	2000
Gears all Conveyors -	5 000	1.500
Elevator -	2 500	
Coal grinding	7 500	2000
Oil House	3 000	1000
Rope Drive pulleys.	7 000	2000
Top Crusher plant		
Hopper 5 ft rolls a	10 000	2500
Hopper 36.	7 500	2000
foundry	713700	

Brot forward	715 700
100 Skips + Cars	42 000
Locos.	25 000
Erection foundation etc	40 000
	822 700
Land	69 000
	891 700

196000

6.95.7

69.7

6.26.

60

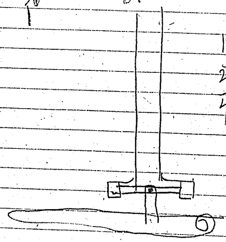
5000

120

2

24.20

480



- 822 700

	822 700
Piping pumps -	12 000
Reservoir -	4 000
Shovel work + mine opening	8 000
Extra appliances roasters	10 000
Lighting	10 000
Steam piping Feed heaters	10 000
Blowers -	5 000
Oil System	8 000
Steam Heat	12 000
Tracks + Ties	18 000
Office + Storehouse -	6 500
Round House -	2 500
Air Compressors etc Boiler -	7 500
Shop Boiler + Heat	2 500
	938 700
	68 000
	1 006 700

460
20
920

48
12
96
48
5720
1152

15000

1500 —

1728) 34800 (20

10
8
460
3680
1840

24
24
96
48
5760
4808

460
12
920
460
5584
5136
53

1728) (3.3

460
33
138
1380
15181

3500 —

30
8
240

3c

lbs
7500 — 200
10000 — 300
9000 — 400
8000 — 360
10000 — 240.00
400
500
200
300

Lead tetraphenyl etc
Jnl Chem Soc 54 1888 283
See Polis (Ber 20 3331 3336
See Chem Soc Jnl 1887 572

Dichroïns, compounds having fluorescent & dichroic qualities
See H Brunner & P Chuit
Ber 21 249 256. Chem Soc Jnl 54 1888 p 363 —
also Kramer & Brunner
Chem Soc Jnl 1884 1354
ditto. Liebermann C Soc Jnl
1874 693 — Ent big book

Phosphorescent Blende
A Verneuil Compt Rendu
106 1104 1107 ditto (107) 101-104
& Chem Soc Jnl / 1888 1248

Action Zinc Cyanide on Metallic Chlorides by R Varet Compt Rendu
106 1080 1083 also Chem S Jnl
1888 54 799 780 — good

for dissolving Cellulose
Acetone-chloroform Chem Soc.
Jnl 1888 810
also J pr chem [2] 37
361 374

Action of Pyridine on Metallic
salts, Chem Soc Jnl 1888
54 850 –

Ent

For Estg Ferrocyanide Espelly
FeCy + FeCuCy

Uranates of Ethyl methyl
Etc ammonia C Soc Jnl
1888 918.

Diacetylene best absorbed by
95% alcoholic sol aq nitrate
if in Excess dis precipitate,
all hydrocarbons of acetylene
series form compounds
mostly crystals see
Chem Jnl 1888 930 –

Ent

Na & K Tungstate Equal
molecular proportions form
salt with Tartaric acid
C S Jnl 1888 938

Aniline Combines Cuprous Chl
C Soc Jnl 1888 941

Luminescence of Pyrogallate
C Soc Jnl 1888 1000

action alk Phosphates
on alk Earth fusion good
CS Jnl 1888 1033

Double phosphate
Magnesium group
C S Jnl 1888 1035 good
fusion

Benzene derivatives of high
Molecular weight
Pentadecyl para tolyl Ketone, etc
Krafft Ber 21 2265
2271 also C Soc Jnl
1888 1087 ditto 1887
252

Dichroism Chem S Jnl
1888 1182 1183

Chl Zinc Combines with
ammonia & basic organic
Substances picaline etc -
Nitrates similar - Crystallizes
from alcohol Chem Soc
Jnl 1888 1281

Dichroic Crystals Chem S Jnl
1880 41

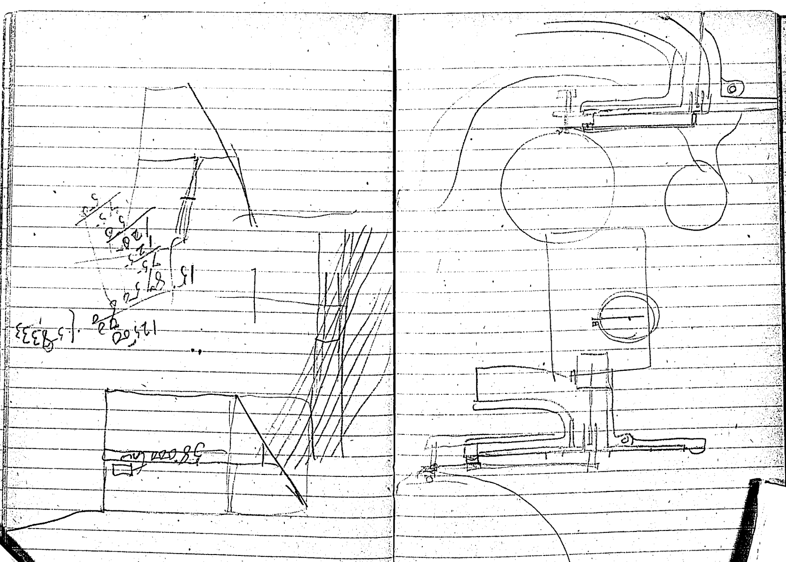
ditto p 105 106

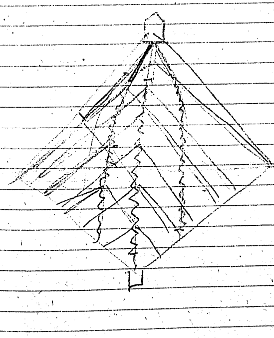
Phosphorus in Vacuo -
Pt Cy Kay - etc Chem Soc
1880 ~~41~~ 204

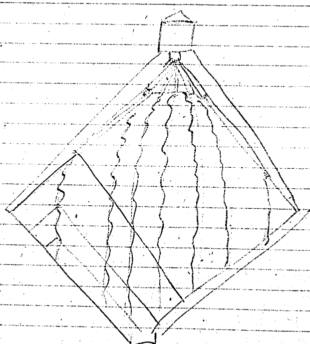
Diphenyl Salts Chem Soc
1880 476 477

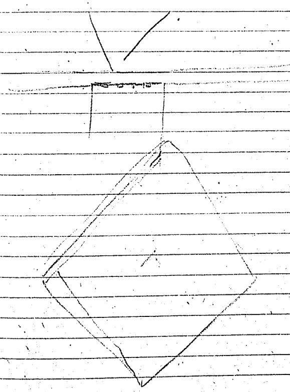
Dichroic Crystals
Chem Soc 1880 644

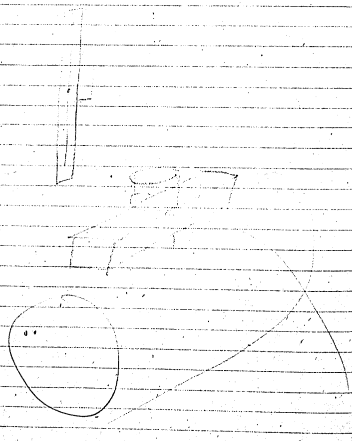
Uranium Oxyfluo Compounds
with fluorides of Alkali Metals
Chem Soc 1880 794 also
A Ditte Compt R 91 166 168 853
ditto 91 115~~0~~ bearing fluorine
Compounds of Uranium
Double Salts Propionic acid
Chem S Jul 1880 799

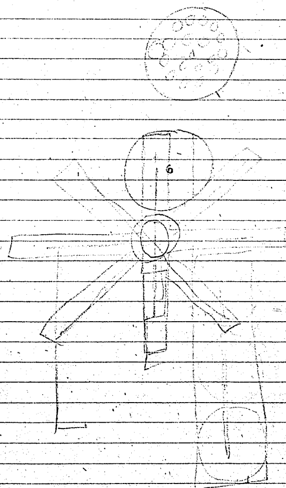


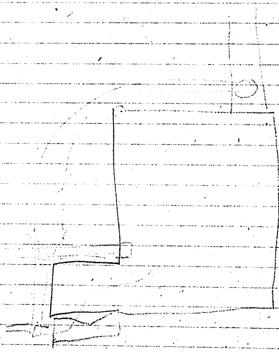












[illegible]

365
20
7300

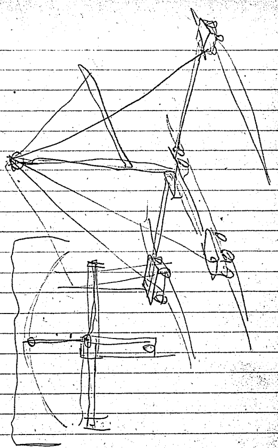
625

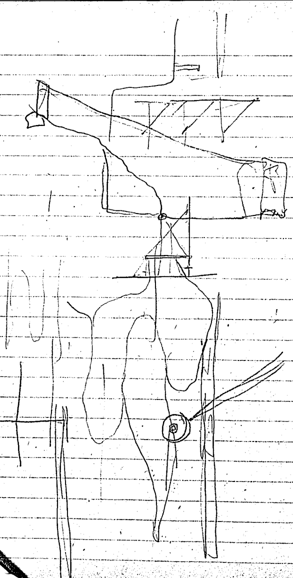
$$\begin{array}{r} 625 \\ 16 \\ \hline 3750 \\ 625 \\ \hline 10000 \end{array}$$

16 | 100 (.625
96
40
32
80

16	10. ~~16~~ .625
17	10.625
18	12.250
19	13.875
20	14.750
21	15.375

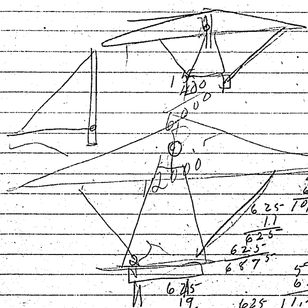
16 —	10
17	10,625
18	11,250
19	11,875





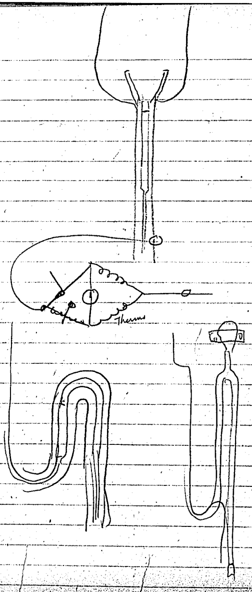
625

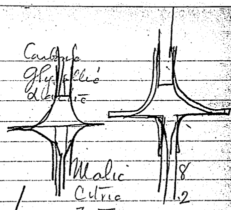
16 —	10
17	10.625 —
18	11 250
19	11 875
20	12.500



$$\begin{array}{r} 625 \\ \underline{17} \\ 4375 \\ \underline{625} \\ 10625 \end{array} \qquad \begin{array}{r} 625 \\ \underline{1.1} \\ 625 \\ \underline{625} \\ 6875 \end{array} \qquad \begin{array}{r} .625 \\ \underline{18} \\ 5000 \\ \underline{625} \\ 11,250 \end{array}$$

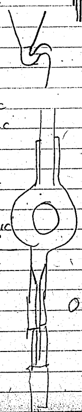
$$\begin{array}{r} 625 \\ \underline{19} \\ 5625 \\ \underline{625} \\ 11,875 \end{array} \qquad \begin{array}{r} 625 \\ \underline{20} \\ 12500 \end{array}$$





Formic
acetic
Propionic
Butyric
Caproic
Caprylic
Pelagonic

Carbonic
Glycollic
Lactic



Malic 8
Citric 2
Tartaric
pyrogallic 2'500
Acrylic 1
Crotonic 5 of 1/
Angelic
pyroterebic
Damaluric
Campholic
Moringic
Hypogaeic
Oleic
Brassic

Oxalic
Malonic
Succinic
Lipic
Adipic
Pimelic
Suberic
Anchoic
Sebacic

Benzoic
Toluylic
Cuminic
acrylic
Adipic

Oxybenzoic
oxytoluylic
phloretic
oxycuminic
aconitic

Allophanic
Allanturic
Alliturie
Alloxanic
Allthonic

Antimonates
Oxychloride Antimony
Sulphantimonates

Arsenites
Arsenite
Oxysulphide Barium

Double Benzoates

Bromobenzoates
Chlorobenzoates
Nitrobenzoates
Nitrochlorobenzoates

Cyanide Phenyl - (Benzonitrile)
for double Salts

1	150
4	600
2	800
1	150
1	175
1	150
4	600
2	300
1	150
1	150
6	900
2	550
3	500
1	150
2	270
1	300
1	~~0~~150
1	200
2	270
1	400
1	350
2	375
41	7140

350
4
1400

3 850
5 675
1525
3
4575

14

350
14
1400
35
49.00

Hydride of Benzoyl Combines
with Chl Calcium also with
acid sulphites of alkali
metals

Hydrides of Nitro benzoyl

Benzylamine (Toluidine) (C_7H_9N)
Combines with acids

Cyano benzylamine

Boron Nitride (White)

Borates best made by fusion
where it is a strong acid

But want all the Borates
that can be made in wet way

Bromoacetates
Dibromoacetates

Bromates

(Camphoric acid)

Cyanides with alkaloid bases & amines —

Conine Salts of Brucine, Caffeine
Codeine Quinine, Strychnine
Quinidine & other alkaloids

Butyrates,

Double chloride Bromides & Iodides of Cadmium — They form many double salts

Chloride Cadmium form double salts with Hydrochlorides of organic bases Vol I 784

Oxychloride of Calcium
CaCl combines with ammonia also with Chromic acid & acetate & Oxalate Potassium

Copper Nitride well,
Nitrides dissolve in
Cyanide Potassium S S

Cuminic acid - good.

Nitro Cuminic acid

Hydride Cumyl unites with
acid sulphites of Alkali
Metals

Cyamelunic acid

Cyanide of Ethyl forms solid
Compounds with some metallic
Chlorides

Sulphethylates or Mercaptides

Fumaric acid

Malic acid (fluorman)

Glyceric acid
Glycollic acid

Dilituric acid, (good)

7 oven 3' 22 tons

13
30
12
60
18) 300 (20
360

730

68
5
340
17
357

360
230

540
10
120
67

1500
140
6000
15000
2100
2040
612
(300
924

318
170
2226
318
3406

1350
16) 81008 (5062
80
100
96
4

2240) 50620 (2.21
4480
5820
4480
340

1326

2233

506
60
3036

2240) 7130 (319
6720
4100
2240
1860

319
7
2233

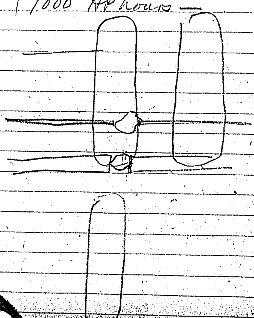
135
2216) 8100 (3506
8000
100

16) 14000 (7130
112
26
16

Oxide	3500
Zinc	1500
Troughs & grids	1000
Furnaces	500
Zinc Retorts	
Rolls etc	2500
	9000

Say 10 000 —

1000 HP hours —



1000 Hp — 16650 lbs oxide

$3333 —

16650 Zinc

$1500 —

80

Cells & grids — 1000 —

20 —

16650 —
9
149850

50 — 3 HP hours

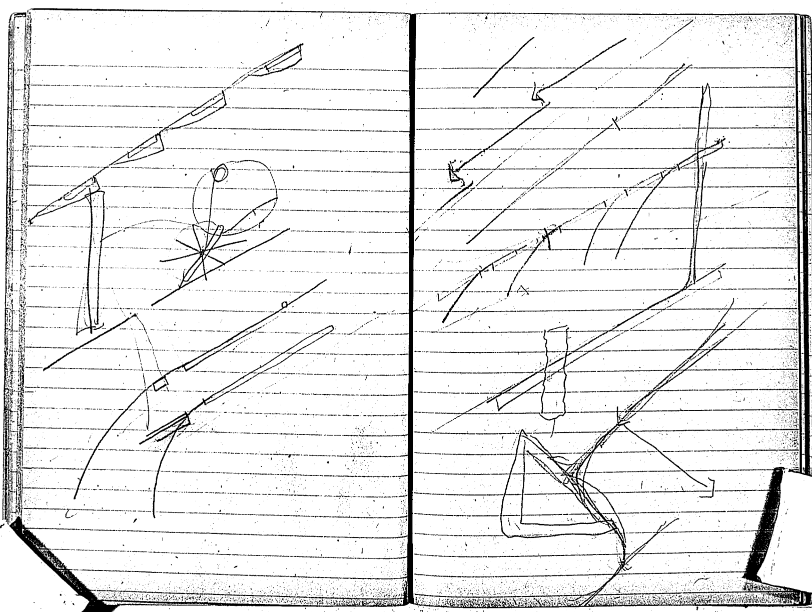
1

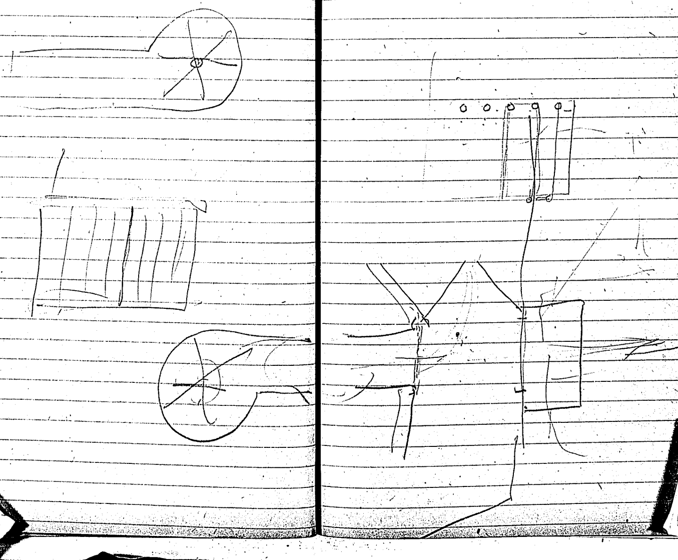
2

1000

333
50
16650
1000
333000

Bailed





300—

60—

75— 100—

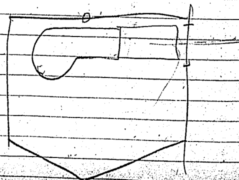
21

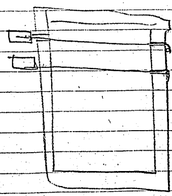
Q 70

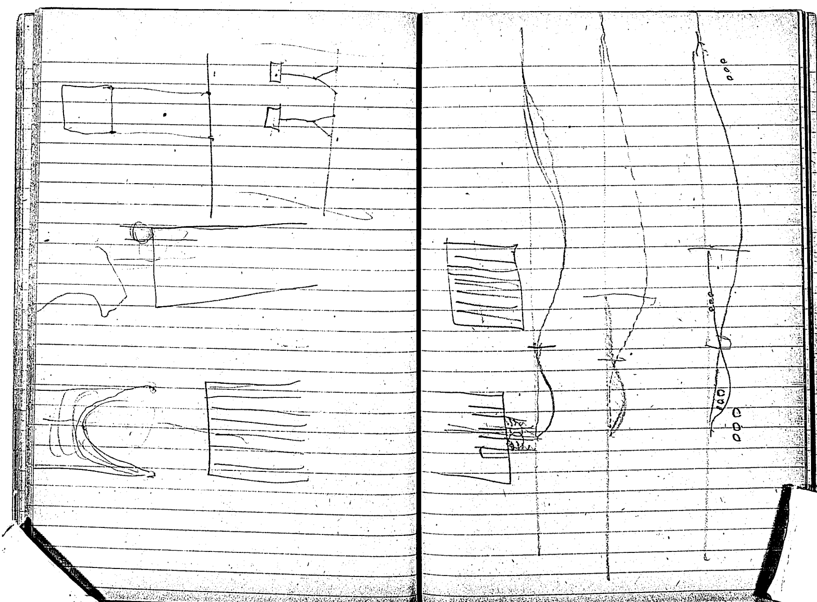
60

20,

18—21







1 ft equal 8 ft

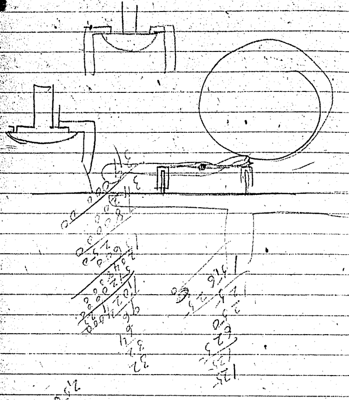
144
8
1152

8. 690. 1 Hp hour

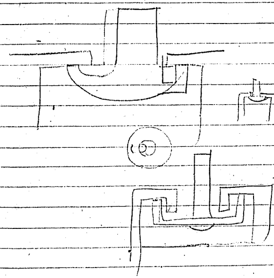
690
44
2760
2760
30360

$\frac{1}{10}$ ampere per sqr inch –

1 plate 1 ft sqr corrugated
1/8 to $\frac{1}{16}$ centers equals 8 ft
both side or 1152 inches
& at $\frac{1}{10}$ amp gives 115 amp
6 plates to jar 690 amperes –
4 jars 2 $\frac{1}{2}$ Hp,



1/0 cells 8000 watts,
1 ton carriage 100 watts per ton 80 miles -
1% of charge is 80 watts.
If 20 lbs taken off any Motor 1 watt per
pound taken off - or in above case 1% saved
or if 20 lbs left & effecy Motor increased
1% - is saving of 80 watts,
So that if Motor Can be increased in
Effecancy 1% - can add 20 lbs but
to gain anything should be less than
20 lbs - Saving of 25 lbs means
about 1 mile more.

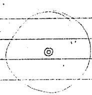


25 50

83

35

38



36 ... Mult

3 Bikes

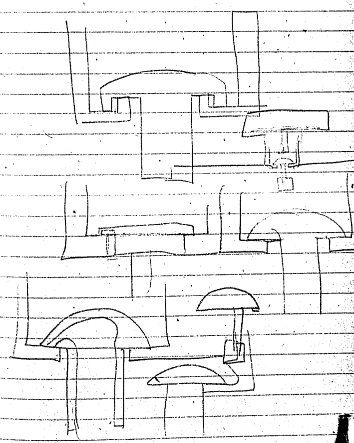
6 Slides

6 Waverly

Extra | daily

5 |16

80

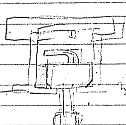


3.

.35
9

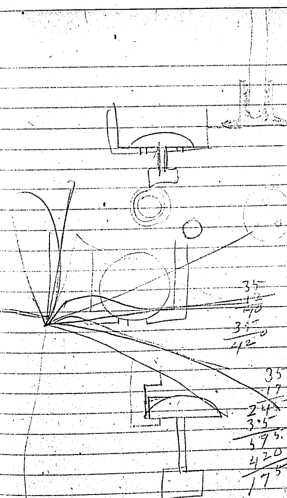
21 grams

48
14
192
48
672



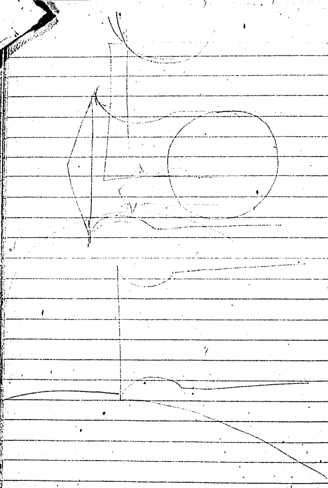
450) 672 (1.5

141



35
12
70
35
420

35
17
245
35
595
420
175



2.

Hester -

The screens in Rescreening building will be 16 high arranged same way as over 3 Highs - The building should be 125 ft longer than necessary to get in

2000 - 1000 lbs batty
600 lbs load

3600 lbs -

50 watts per 1000 lb mile.

180 watts per mile -

100 - 38 52

36
50
180

19) 1000 (52.6

135
52
270

66.7 miles

180) 10400 (58
900
1400
1440

270
675
702

4500 225

225) 14400 (64 miles
1350
900
900

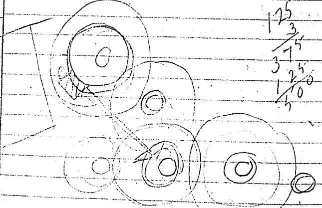
500-

3 200

650-

35

125
3
375
125
500



125 200
25000

1000 5000 125

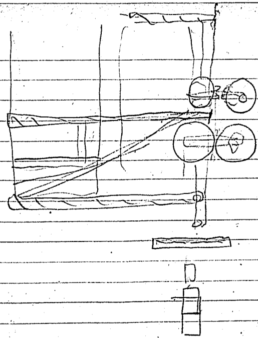
38

114

95

1000

95



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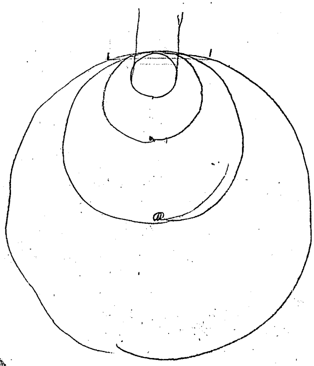
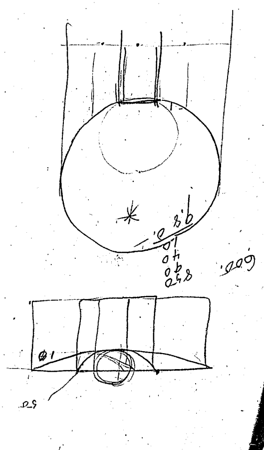




1720
1744
1768

1000- 172
1064 164
1128 156

17.5

2125
12
4250
420
850
12
3) 4250
1416
170
830
1020,
1064
64
1128
283
1416
1699

1720
24
1784 —

5) 4250
850
72
21244
1062
1274,

3000
1720
1720
3000
1064
1986

1280
1424
1616
} 144
} 336.
28
3
37.

66) 4250. (64.4
396
290
294
260
260
64
37
448
192
23.68

1064
3
3192
1768
1424

3384
1768
1616

1128
3
3384

1064) 1744 (164
1064
500

1128) 1768 (15 6384
1128
6400
5640
7600
4160
4256

1424
1280
144

1616
1280
336

300 tons –

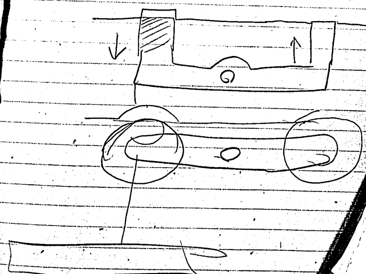
Crude –	2% –	6	294	
Giant.	2%	6	288	
Int	5%	14	274	
1st 36.	5		260	
2nd 36.	10		234.	36%

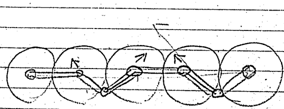
14) 679360 / lbs deg
4852

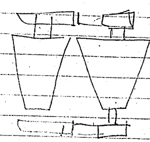
48 lbs hour 3.81400 / 679360 (48,
20.

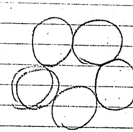
234
85
149

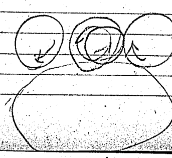
234
35
1170
702
819

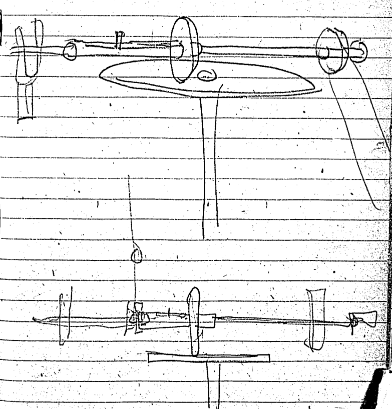








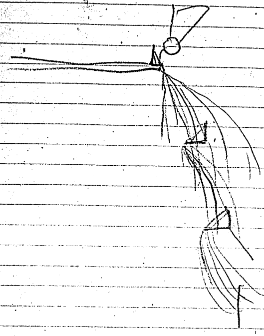


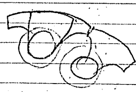


20

15

20





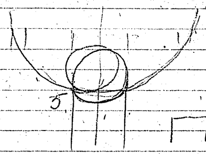
24-

500-

$12\overline{)250}(20$
$\underline{240}$
1

60

110
$\underline{20}$
220:-



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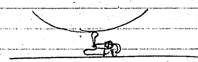
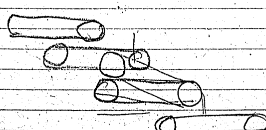
40.

5 20





25800
500 Supplies etc -
150
26450

360 day

Dec 1st payroll - 10800
Supplies etc 26450
37250

Jany 1st 37250
10800
48050 — 48050.

Feby 48050
10800
58850

58850

360
28
2880
720
10080

Mch 1st 58850
10800
69650 — 69630

apl - 69650
10850
80500 — 80500 —

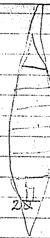
50
6
300

200

600

400
300
2000

28



11

12000 -
800 -
500 -
400 -
300 -
500 -
2900 -
800 -
3500
1000
1200
500
500
800
100
2580

125
75
125
75
400.

75
15
6
30-
7
54
90
25
30
332

24
4
96

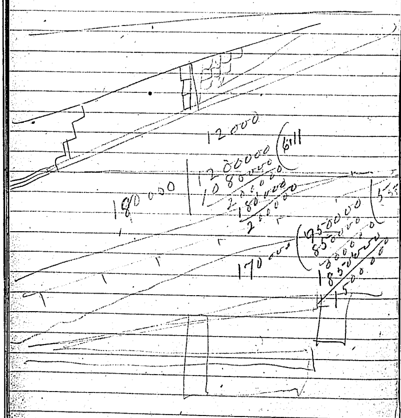
60

40
135
40
540
90
30
27

42

460
25
2300
920
115

25
3
75



12000

180000 | 1200000 (611
1080000
120000
180000
200000

170000 (9500000
8500000
1000000
18500000
1500000

500
200
150
675
525
2400
3925
611
558

135
5
675

200
150
350

4500
350
1060
300
5710 135
1 6
810
4 250
1060

240

5700 Say 60 day

400) 6000 (15c
400
2000

15c

16000 95 170000
611
170000
170000
170000

3 | 160
53
3

102

103870000

Wages per run

B. [illegible]	145
Stk	145
Top Mix	160
[illegible]	145
Mixer	145
[illegible]	145
Below	290
Furnace	145
Dump	290
95 196	145
[illegible]	200
Eng.	300
Ovens	450
Foreman	400
Genl	350
Mech	350
6	870
Mac	550
Top	145
Coal	270
Boster	150
Clean	270
Overf	200
Cut	300
	6555

$66 -

140
6
840

8
50

50 -
200 -

670

57 / 565
200
365

375/2 | 6600 (17.6
375
2850
2625
225

5000
4800
2600
[illegible]

17.6
20.0

5
4
3

365
700
25551
6
1533

49

350
4
1400 -

60 000 -

26
4
104

375/1000 (

67

60 -

375
250
625

402

83 | 600 (

20

700 times

35 | 700
35
350
245

240
8
8
192

Drafting off.	3		1200	
Foundry	3	1x	450	
Power station	12		2050	
Electric	7		1150	
Oil	5	2T	700	
Blacksmith	10		1750	
Machineshop	40		8700	
Storeroom	4		700	
Watch	4	15x	700	
Yard	15	day night	2255	
CP	31	2x day	5105	5105
Mill 1	37	2x day	6685	6685
Bkr	41	3x day	7140	7140
Shovels 3	24	30x day	4575	4575
Locos	8	day	1400	1400
Drillers	28	day night	4900	
Miners etc	12	6x "	2000	
Strippers etc	12	11x day	2100	
Pond	1	day	200	200
Carpenters	6	day	1500	1500
Genl Staff	4	day	2700	2700
Clerks	4	"	900	900
Genl	6		1000	1000
	307		60160	31205

	Men	Cost
Day shift	307	601
Night shift	162	312
	469	913

of which 75 Italians

1000 67/20000 (298 — 20 net

134

663

603

578

53

469

75

394 — men

20000

2500

80

30

13

60

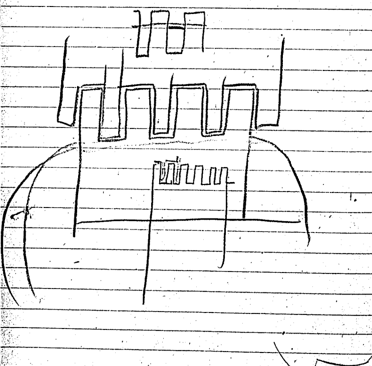
21

73

162

1300

1000 Ton	67 -	20 nct	298 Tons
1200			357
1400			416.6
1600			476
1800			535.6
2000			595
2200			654
2400			713
2600			772
2800			831
3000			890
3200			949

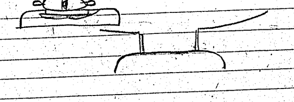


100 watts per Ton 1 mile –
40 cells – 80 miles –
or 1 Ton   40 miles
80 watts is 1% of watts in batty –
50 watts.
1% – 80 watts.
20 lbs per 1 watt per cent

40
250
800

1%   2   4

75
4
300



1842

22500

300000

30
280
260

150
3
450
450
225
225

10
35
70
35
7
35
7
66
6
66
35
6
139
115
08

29

360 tons
5
1800
60

200

1800
24
7200
3600
43200

3000

300

12000

240000
24000
2

1200
20
24000
201
390
33
550

367

368

900
2000

1300 sec

8000

10000

35000

25000

6000

12
240
240

200

25

35

6500

650

21

67) 1200 (18

67

536 90-

12,500

80

24

192

2000-

2n

CuO-
H

240-
8
1920-

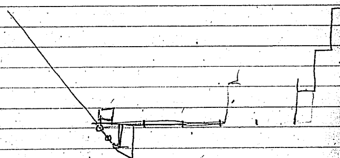
1800
20
68) 3600 (530
340

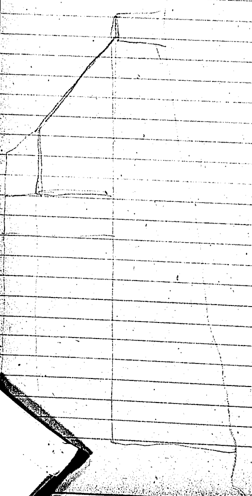
530
5
2650
24
1060
5300
7) 63.800
31 8 25

250

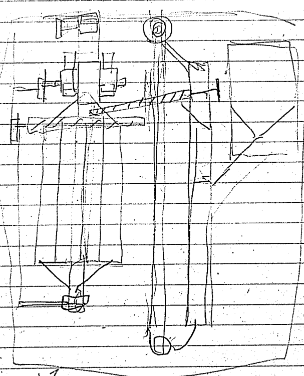
30000-

100
60
15) 600 (4,000
60 20
8000

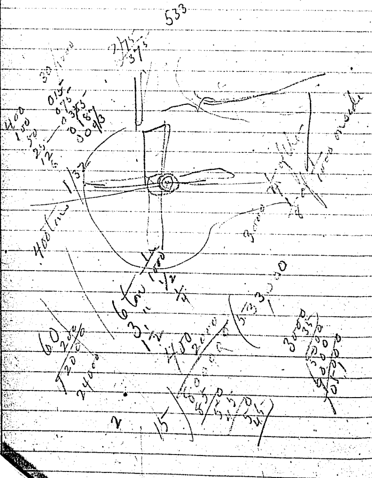




89.59
20.46
69.04



1000 HP
1000
20,000



2	300
2	600
2	300
6	900
6	900
2	300
1	175
3	500
2	270
1	175
1	150
1	135
1	100
1	300
	3105

1	150	1	300
1	150	2	375
1	175	1	135
2	350	1	350
1	170	2	350
1	200	1	300
2	350	2	300
2	350	37	6685
1	175		
1	175		
2	360		
3	525		
1	160		
2	320		
1	160		
1	200		
2	300		
2	300		

4 Engrs	20,00
4 firemen —	1200.
2 unloaders —	600
4 Dryers —	1200
20 Screeners	5000.
16 Blowers	4800
4 oil —	1200
2 Engrs —	800
2 Helpers	600
6 firemen	1500
12 machinists	3600
6 Helpers	1500
4 Boys	600.
4 foremen	2400
1 Master Mec	800
1 Supt	1500
1 " mplts	800
Yard gang	2000
16 Rescreen	4800
4 office	1800
2 Mech Engs —	1600
Trackgang	2000
	42300

shovel — 8 gangs —	20000
Loader gang — 12	3600
	42300
assayers —	800
	00
	667

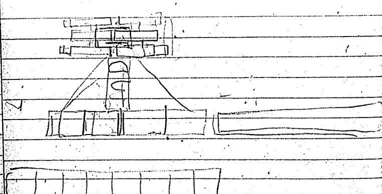
25
8
200

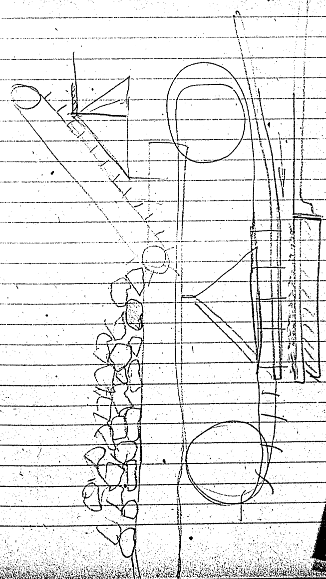
5000 | 66900 (13.3
50000
16900
15000
17

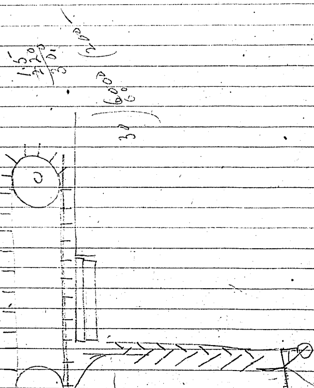
1450
6

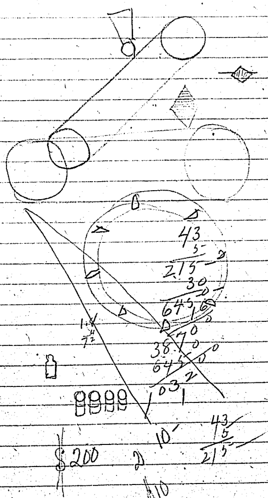
20

$6\frac{1}{4}$








43
5
215
30
645
$200
10
2
43
5
215

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